THE FOUNDRY
May 1943
FIFTY-FIRST YEAR

Bartlett-Snow

SAND, MOLD AND CASTINGS HANDLING

DUST AND FUME CONTROL SYSTEMS

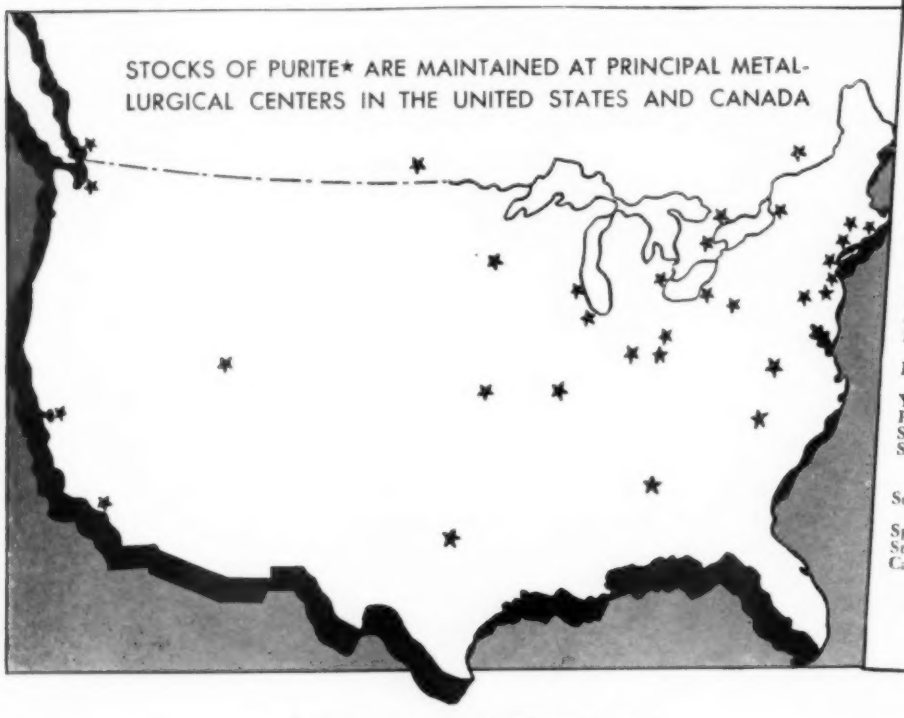
Vital for the War Effort...
and for Profitable Peace-time Operations Too!

THE C. O. BARTLETT & SNOW CO.
6201 HARVARD AVENUE • CLEVELAND, OHIO
Engineering and Sales Representatives in the Principal Cities

# THE FOUNDRY INDUSTRY DELIVERS THE GOODS!

**TODAY** foundrymen are producing high-test castings with all-scrap mixtures which meet the rigors of war in every climate from the South Seas to Siberia. Mathieson takes pride in the part Purite is playing in helping to meet the demand for maximum production of sound, dependable castings. In cupola and mixer ladles in gray iron foundries Purite is reducing rejects and speeding production of high-test castings that machine easily and take a high finish. In converter steel foundries Purite is reducing sulfur from over .10% to under .03% in making castings which withstand the strains of war at 80° below zero. In secondary metal refining and in brass melting, Purite is increasing by several per cent the yield of sound ingots and castings.

PURITE—Soda ash in its most efficient form for metallurgical use




## PURITE DISTRIBUTION POINTS

Birmingham—Hill & Griffith Co.
Buffalo—Combined Supply & Equip. Co.
Frederic B. Stevens, Inc.
Charlotte—The Mathieson Alkali Works (Inc.)
Chicago—Hill & Griffith Co.
S. Obermayer Co.
Cincinnati—Hill & Griffith Co.
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Springfield Facing Co.
New Haven—Frederic B. Stevens, Inc.
New York—Phillips Isham
Oakland—Pacific Graphite Works
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Penn. Foundry & Supply Co.
Pittsburgh—J. S. McCormick Co.
S. Obermayer Co.
York, Pa.—North Metal & Chemical Co.
Providence—Sunlight Chemical Co.
Salt Lake City—Utah Foundry Supply Co.
Saltville, Va.—Mathieson's southeastern plates plant where Purite is manufactured.
Seattle—Carl F. Miller Co.
Western Foundry Sand Co.
Springfield, Mass—Springfield Facing Co.
St. Louis—M. A. Bell Company
Canada—Railway & Power Engineering Corp. Ltd.
Hamilton, Montreal, Toronto, Vancouver, Winnipeg

**PURITE**

## THE MATHIESON ALKALI WORKS (INC.)

60 EAST 42ND STREET, NEW YORK, N. Y.

(Licensee of Metallurgical Development Company, Inc.)

TECHNOLOGY DEPT.

# SAFE WAYS IN WAR PRODUCTION

**NEW WORKER**—Every new employee in a Bethlehem Plant wears this button. It helps to fix his attention on safety. It signals to more experienced employees that he is new to the plant, and they keep an eye on him, and do not hesitate to offer friendly guidance in case he forgets instructions and unknowingly breaks any safety regulation.

Industrial accidents, bad enough because of the human distress they cause, are also a grievous drag on production. Every day that injury lays up a worker means lowered output of the materials our armed forces are asking for.

Safety engineers know they must be more than ever on guard as pressure for production intensifies and men work against time. When war came, Bethlehem Steel Company expanded its accident-prevention program to meet the new conditions. Special efforts were addressed to the new employee to make him safety-conscious from the moment he walked into the plant. And by posters, group meetings and individual instruction, the safe way of doing his job was ground into the subconscious of new Bethlehem employee and veteran alike.

Significant are the results of a current study, showing that of all disabling accidents to Bethlehem employees less than one-third occur in the course of their work. Even with employment rolls upped by the tens of thousands and plant operations at top speed to meet the demands of the war program, the Bethlehem employee is safest, best protected against injury, during the hours he spends on the job.

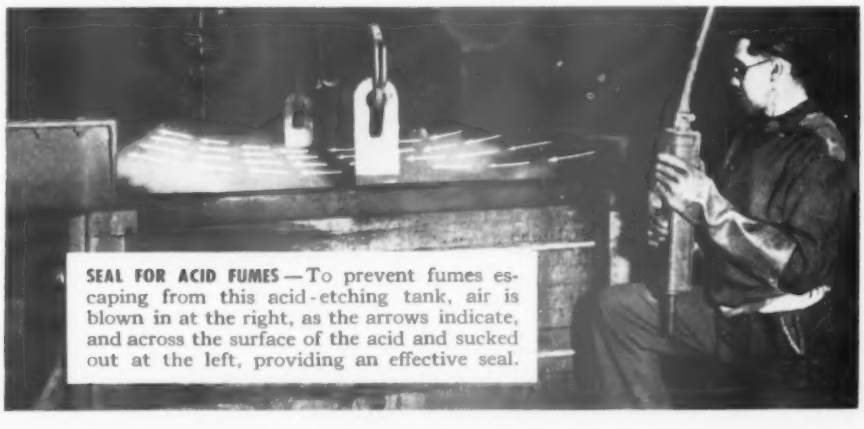
**AUTOMATIC HAND GUARD**—This man is operating a trimming press. If he should absent-mindedly let his hands move too near the danger zone, the two cables will automatically whisk them back to safety, before the ram of the press descends.

**100% HEAT-INSULATED**—Asbestos-covered hood, chrome-leather full-length apron, chrome-leather gloves, chrome-leather full-length sleeves and asbestos guard on torch handle give this worker complete protection against heat and flying sparks.

**EYES DOUBLY GUARDED**—Even though this grinder is equipped with a heavy glass shield, the eyes of the man who is operating it are given further protection against sparks or flying bits of abrasive by the cup goggles that he is wearing.

BETHLEHEM STEEL

*Bethlehem Steel Company is actively supporting the National Safety Council in its campaign against accidents in war production, through the War Production Fund to Conserve Manpower.*



**SEAL FOR ACID FUMES**—To prevent fumes escaping from this acid-etching tank, air is blown in at the right, as the arrows indicate, and across the surface of the acid and sucked out at the left, providing an effective seal.

Photo—R. I. Nesmith & A

# Where Uniformity Counts

● Fighter pilots expect uniformity in Bell Airacobras like those shown above. Mass production ensures that uniformity and guarantees maximum fighting efficiency of every man.

It is equally true that foundrymen expect—and receive—uniformity when they use Federal Green Bond.

Uniformity in strength is ensured by our careful selection of the crude bentonite deposits and laboratory control of every step of its processing.

Uniformity in grinding means speed in blending with your sand, makes Green Bond the ideal bentonite for use in today's high speed mullers.

Regardless of the type of foundry you have or the use you make of bentonite, it will pay you to use

**FEDERAL GREEN BOND**

*Best of the Bentonites!*

## THE FEDERAL FOUNDRY SUPPLY COMPAN

**4600 East 71st Street • Cleveland, Ohio**

CHICAGO CHATTANOOGA, TENN. DETROIT MILWAUKEE MINNEAPOLIS NEW YORK ST. LOUIS RICHMOND, VA. UPTON,

# THE FOUNDRY

for MAY 1943

VOLUME 71 NUMBER 5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# THEY'RE GOING TO TOWN

## *As Fighting Swells on World Fronts, Foundr*

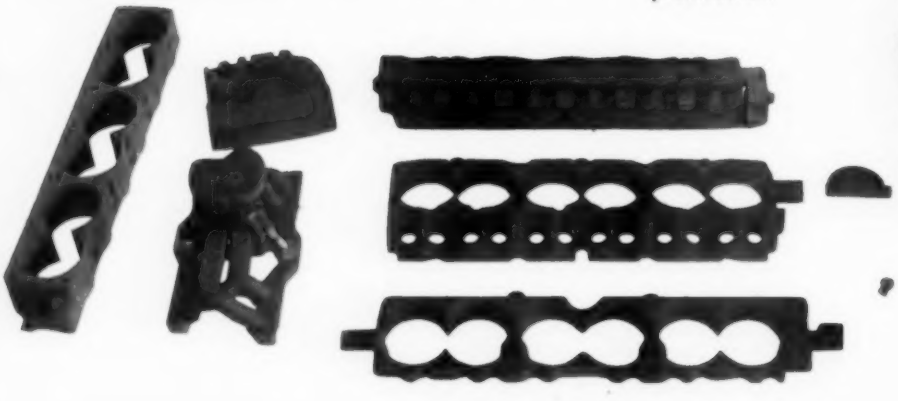
**Nobody knows without looking whether Linoil will do anything more than any other binder for you. But we all know what Linoil is doing in other plants—to the tune of a half-million gallons a month!**

**The point we urge is not that you immediately switch over to Linoil, but that you immediately investigate Linoil. It's no trick to make a comparative and a conclusive test, and if you have not time to do it our man will do it for you in your coreroom and foundry without interfering with your schedules. All you have to do is to check on the results.**

**Every now-enthusiastic user of Linoil was once a disinterested non-user. Like you, he was satisfied (?) or skeptical. But, fortunately for all, the good things about Linoil are technical *facts* and as such are demonstrable. Here is a report of a new user, dated March 19:**

**"Quite busy making large marine cylinders. Ed said he should have been using Linoil all the time, as it is absolutely the finest core oil he ever had in his plant."**

**Keep up the good work. More castings mean more boys come home. Seize every aid to greater production.**



**OIL DRUMS ARE PREC**

Treat them considerately return them as soon as em *At least* once a month all empties.

# THE WERNER G

(DIVISION OF ARCHER

2191 WEST 110 STREET WOODBINE

# N CANADA—WITH LINOIL

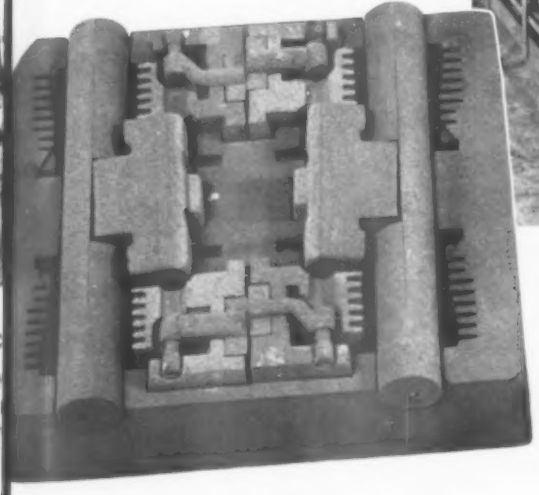
## nen Grasp Every Aid to Greater Production . . .

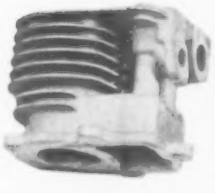
Walker Metal Products, Ltd., Walkersville, Ont., on the left, and Eureka Planter Company, Ltd., Woodstock, Ont., on the right, both showing cores made with Linoil. Linoil is as popular in Canada these war days as it is in the United States. Colin Moore, core boss at Walkers is standing opposite the roll-over machine, and in the circle on the right-hand page we show a snapshot of Al Lawrason, Manager at Eureka Planters. Eureka Planter Company pour brass and aluminum as well as grey iron using Linoil cores for all. In Canada people use Linoil because they save money, time, and worry by using it. In the United States people use Linoil for just the same reasons.

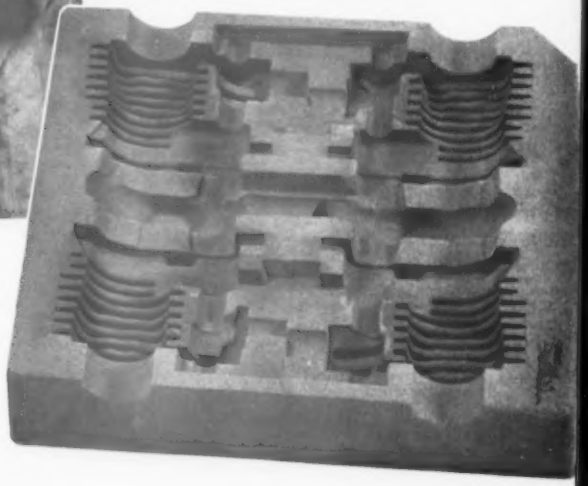
LINOIL

**THINGS TO LOOK FOR IN LINOIL**

(1) In the mixer: Higher ratio of sand, and speed of thorough coverage. (2) Core bench: Evenly structured cores, good clean draws, infrequent cleaning of boxes. (3) Ovens: Speed in drying and evenness of drying to centers without burning of exposed small parts, absence of warping, swelling, cracking, absence of disagreeable odors or irritating smoke. (4) Core inspection: High percentage of perfect cores, reasonable handling strength. (5) Storage: Non-deteriorating, and non-moisture absorbing. (6) Setting up mold: Speedy assembling—no doctoring or correcting by molder, non-moisture absorbing here either. (7) Pour: Small amount of gas, free venting of gas, reduced percentage of core-caused wasters among castings. (8) Cleaning room: Ease, cleanness and speed of the core shakeout.







SMITH COMPANY

DANIELS - MIDLAND COMPANY)

690 CLEVELAND, OHIO

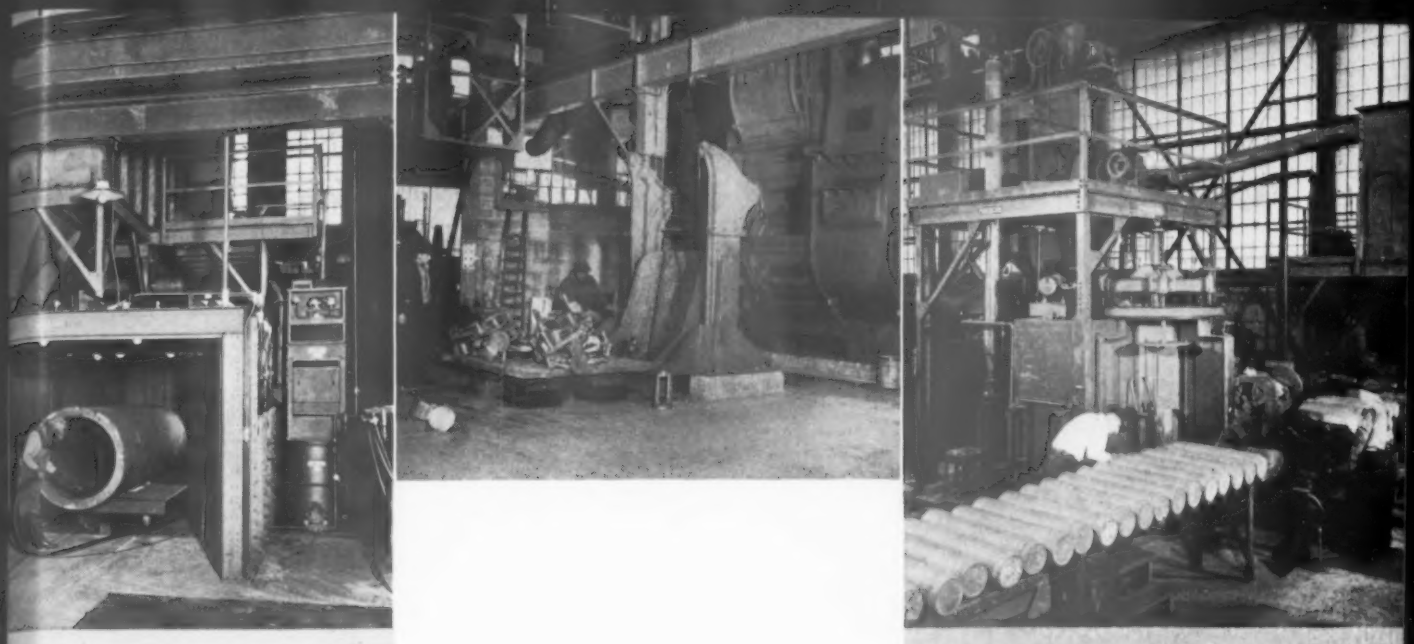
# PANGBORN'S PROUDEST CITATION
## IN
# THIRTY-NINE YEARS OF PROGRESS

1904 ★ ★ ★ 1943

WORLD'S LARGEST MANUFACTURER OF BLAST

# PANG

PANGBORN CORPORATION ★ ★ ★



# THE STORY BEHIND THE WINNING OF THE ARMY-NAVY "E" PRODUCTION AWARD

The men and women of the Pangborn Corporation have been working day and night since long before December 7th, 1941, in order to help overcome the bottleneck that developed in the cleaning of castings, forgings, stampings and heat-treated parts.

Because their all-out contribution of more and better AIRBLAST and ROTOBLAST cleaning units to industry's war effectiveness was found EXCELLENT—they were awarded—on March 13th—the Army-Navy "E" for high achievement in War Production.

We are proud of our employees' loyal and wholehearted cooperation. We are doubly proud of their accepting this award as a *challenge* to ever greater production records—while maintaining always the superior standards of quality and workmanship built into Pangborn products since their beginning in 1904.

AST CLEANING AND DUST CONTROL EQUIPMENT

GRORN

★ ★ ★ HAGERSTOWN, MARYLAND

It takes many years of experience to build a Champion in any field, whether it be race horses, prize fighters or core blowers. Each year of experience witnesses further development, more polish, a finesse that can only be obtained through the trial and error process.

It is Champion's 45 years of experience in the foundry industry that has made Champion Core Blowers the leaders in their field; simple, sturdy, efficient tools for the economical production of uniformly accurate cores.

Modern design assures a maximum of perfectly rammed cores by comparatively inexperienced operators. A man, woman or child can quickly lea to make complex cores that have lo been stumbling blocks for others.

A single valve operates the core b clamp, clamps same against the blo plate, blows the core, exhausts and r leases the clamps in the proper cyc

When today's *impossible* producti schedules must be met, it's still sma to string along with a Champion. Wh tomorrow's competition confronts yo Champion's advanced design will he you to earn real profits.

CHAMPION

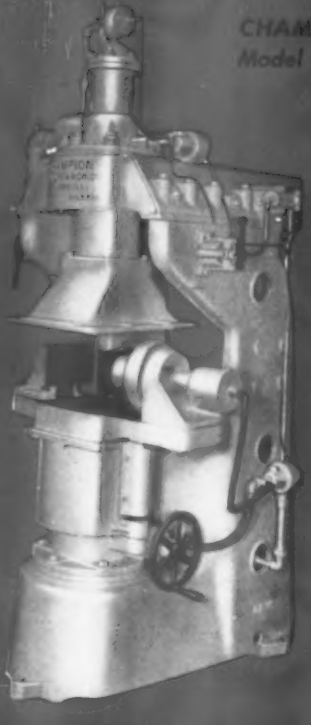
CHAMPION
Model CB-400

CHAMPION
Model CB-15

# core blowers

**were not made overnight. They are the result of 45 years of experience**

CHAMPION
Model CB-12



CHAMPION
Model CB-8

**N Foundry & Machine Co.** 1318 West 21st Street
CHICAGO, ILLINOIS

# You want top efficiency to solve the problems of today and tomorrow

TODAY, all foundries agree that sand should be mulled to insure uniform, properly conditioned sand. But the important point is this: when you mull your sand *be sure you have the right machine* — there is a difference . . . proved by records and production experience!

Simpson Mixers, engineered and built for today's sand conditioning problems, are the "accepted standard" in most all of the foundries in the United States and Canada for turning out the required tonnage of properly conditioned sand at the lowest cost per net ton. Isn't that the criterion by which to judge in choosing *your* mixer? There are many reasons for choosing a Simpson. Simplicity of design and ruggedness of construction are two principal Simpson features which help assure uninterrupted service — the kind of service you require for the high production of properly prepared sand, using a *minimum* of bonding materials, power, labor and maintenance.

Simpson Intensive Mixers are built in a range of ten sizes to suit every production requirement. They may be equipped with cooling hood or dust cover, various weights of mullers for different classes of sand*, aerators, bucket loaders, liquid batch meters, and automatic timing devices — any auxiliary equipment to fit them for top production efficiency, whether operating as single units or as a part of a large system.

National foundry engineers will assist you in solving any problem in sand handling, conditioning or control. Call on their experience — there is no obligation.

*. . . . *Simpson Mixers do not break down the sand grains!*

## NATIONAL ENGINEERING SERVICE . . .

## *on the job to help you*

### FIELD SERVICE

National engineers are on the job constantly helping foundries solve problems of sand handling and control on construction, maintenance, repair or new requirements. National Field Service is available and eager to help you whenever and wherever you need it.

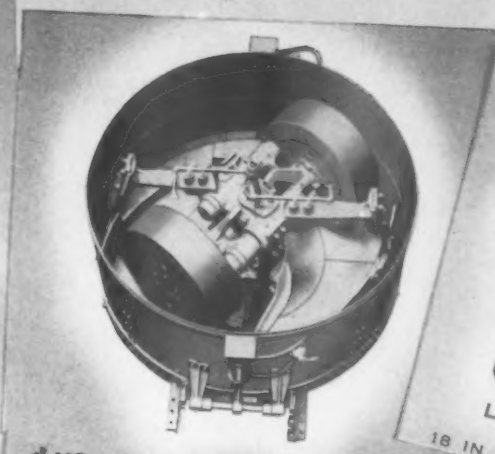
### SERVICE MANUAL

This Service Manual is helping keep National Equipment operating at top efficiency. Containing complete installation, maintenance, operating and lubrication details it is on hand wherever National Products are working. Available to all who can use it — it is a part of National's thorough service.

### CASTING WEIGHT CALCULATOR

Many thousands of these simple, easy-to-use calculators have been distributed throughout the foundry industry. They help save time and avoid guesswork in estimating castings. If you would like to have one, write us on your company's letterhead. They are free, of course.

NO. 0—8 FT. DIAMETER PAN



NO. 3½—9 FT. 3 IN. DIAMETER PAN

LABORATORY SIZE
18 IN. OR 24 IN. DIAMETER PAN

# . . . . there is a SIMPSON *Intensive* MIXER to mull your sand properly, at the lowest net-cost-per ton

NO. 1—4 FT. DIAMETER PAN

NO. 2—6 FT. DIAMETER PAN

NO. 1½—4 FT. 6 IN. DIAMETER PAN

NO. 3—8 FT. DIAMETER PAN

## NATIONAL ENGINEERING COMPANY

MACHINERY HALL BUILDING • CHICAGO, ILLINOIS

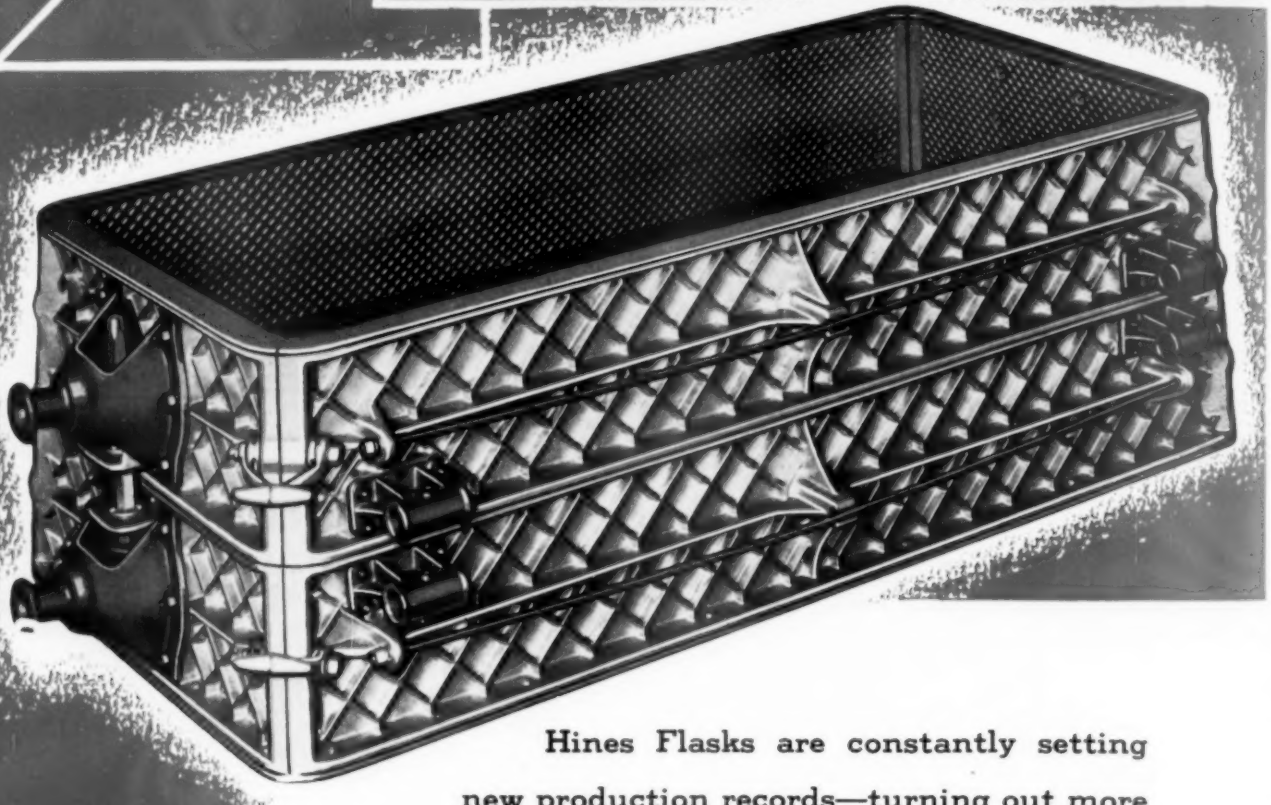
Manufacturers and Selling Agents for Continental European Countries:—The George Fischer Steel & Iron Works, Schaffhausen, Switzerland. For the British Possessions, Excluding Canada and Australia—August's Limited, Halifax, England. For Canada—Dominion Engineering Co., Ltd., Montreal, Canada. For Australia and New Zealand—Gibson, Battle & Co., Pty., Ltd. Sydney, Australia

SIMPSON

INTENSIVE MIXERS

Built in 10 Sizes

# Save and HINES FLASKS

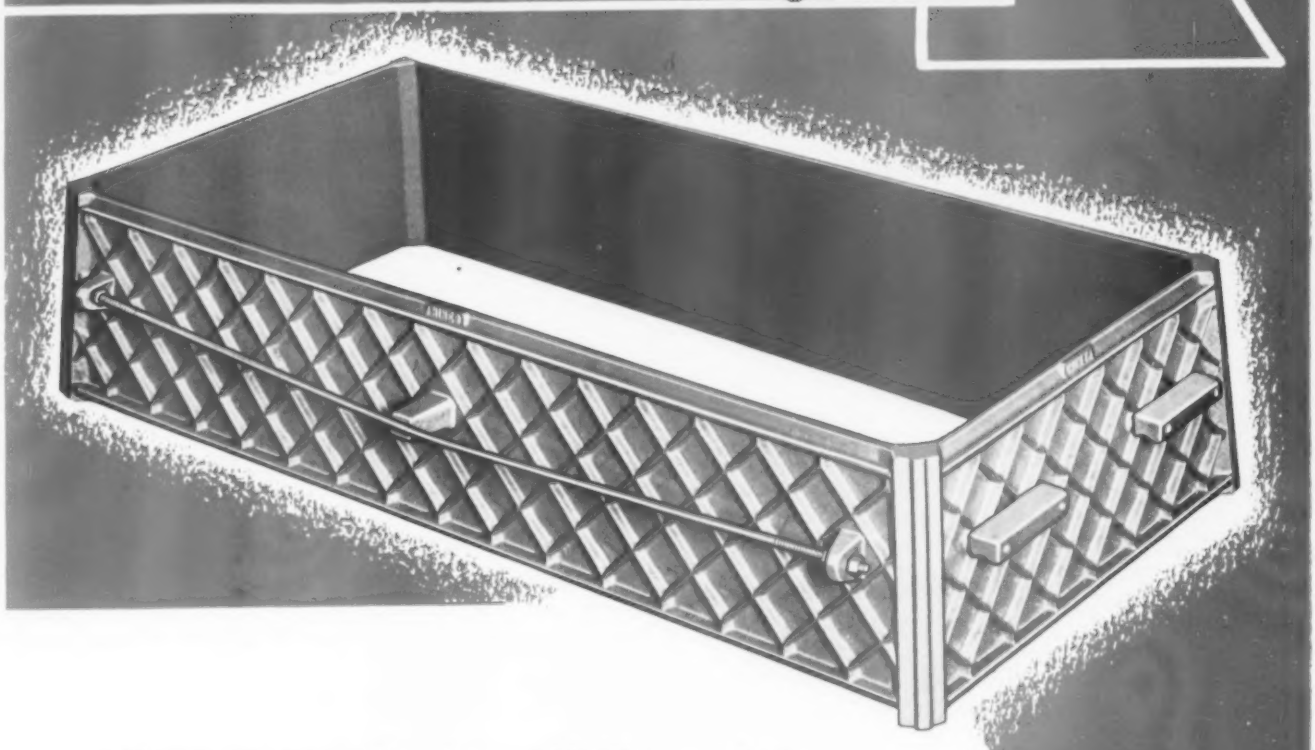


Hines Flasks are constantly setting new production records—turning out more molds per day with less scrap,—with double savings to the users.

*Production schedules can be easily met when Hines Flask Equipment is used.*

HINES FLASK

# be Safe WITH AND JACKETS!



Hines Jackets fit the mold like a glove. With Hines Flasks they form the perfect team for quantity production of high quality castings.

*Write us about your flask and jacket requirements.*

CO. 1324 HIRD AVENUE • CLEVELAND • OHIO

## THERE ARE NO "VIRGIN"

# ALUMINUM ALLOYS

Just the moment the alloying process starts, the aluminum is being *re-melted.* It may have been re-melted once before, from pig out of the electrolytic cells, into ingot.

Even some of the alloying elements like copper and magnesium may be re-claimed metal.

There is no way of identifying "secondary" aluminum alloys from "virgin" by physical properties or other characteristics when the composition is the same.

"Secondary" aluminum made from properly chosen scrap, melted under rigid technical control, checked for analysis and physical properties, is today being used wherever aluminum is fabricated.

There are many aluminum alloys not conforming to the analysis of "primary" aluminum which are extremely useful for many applications.

Several aluminum alloys have been developed by National Research Laboratory. There are one or more National alloys to meet your foundry and physical requirements.

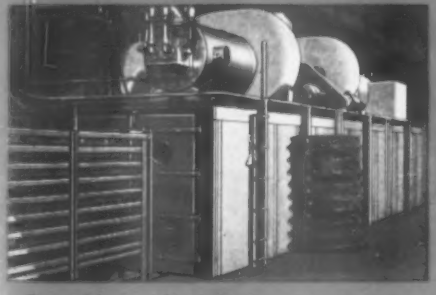
Tell us your needs. We will recommend the proper National ingot.

## THE NATIONAL SMELTING COMPANY

CLEVELAND, OHIO

Despatch vertical type core oven, 40 ft. chamber

Despatch rolling drawer core oven



Despatch horizontal intermittent conveyor core oven

The speed, accuracy and productive capacity of Despatch core ovens — needed today for war — tomorrow will help you meet postwar competition by assuring high quality core-baking at lowest possible cost.

So it is important that you inquire about these ovens now, and learn how they are helping hundreds of foundries maintain record core-baking production with most efficient use of space, labor and fuel. There are types for all plants.

## PROVEN—33% MORE CORES

Increase of one-third more cores from same oven-area is usual performance. Despatch high-volume heat and airflow system (forced convection) heats entire chamber uniformly. Latest material-handling systems.

## PROVEN—40% LESS FUEL

This saving in fuel results from use of highly efficient controlled-combustion type Despatch heaters. Gives maximum heat from gas or oil consumed at any control-setting.

## PROVEN—100% HIGH QUALITY

Fine quality baking is assured, regardless of arrangement of load. Positive control of heat and moisture-removal. Eliminates rejects and keeps all batches uniform.

*ASK FOR DETAILS, photos and other data on Despatch Core Ovens.*

**DESPATCH**
**OVEN COMPANY** MINNEAPOLIS

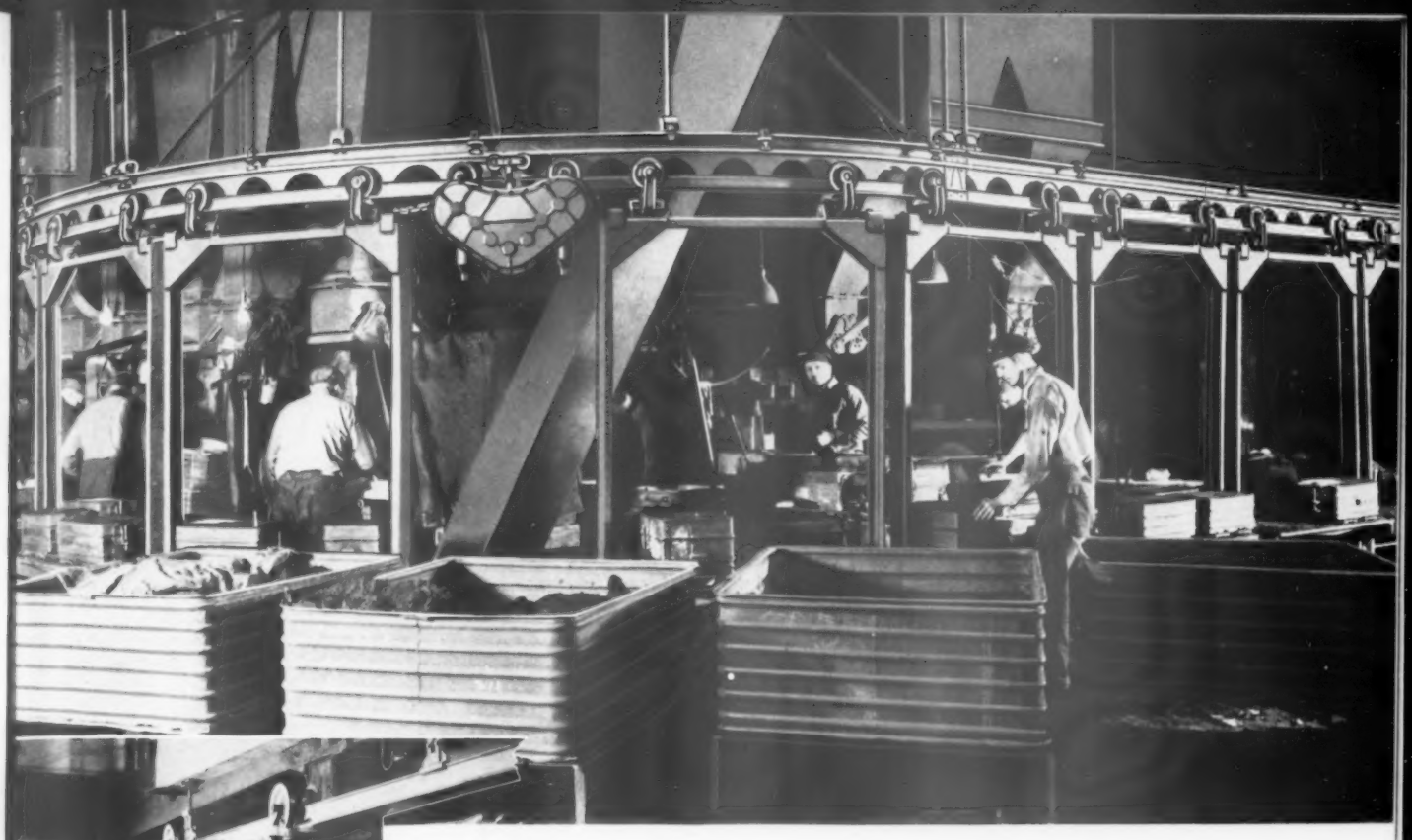
# The first step in the manufacture of non-ferrous alloy ingot from scrap metal

Refiners of non-ferrous scrap metals for 50 years.

# MICHIGAN SMELTING
## and Refining

*Division of* BOHN ALUMINUM AND BRASS CORPORATION, DETROIT, MICHIGAN

GENERAL OFFICES—LAFAYETTE BLDG.



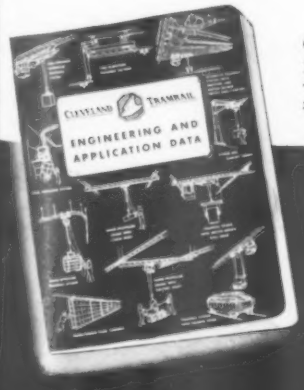
# CLEVELAND TRAMRAIL . . .
# *Continuous Foundry System*
## SPEEDS PRODUCTION — REDUCES EMPLOYEE FATIGUE — SAVES TIME — CUTS COSTS

From 50% to 75% of the usual handling of materials is eliminated with a Cleveland Tramrail Continuous Foundry System. The various foundry operations are so arranged that rack carriers travel on overhead rail from one operation to the other in logical order, and when the entire circuit has been traversed one or a number of castings have been completed.

Thus the carriers travel from the molding section to core-setting, to pouring, to cooling and to shake-out, eliminating the need of carrying sand, flasks, molds, molten metal, castings, etc., to and from the usual pouring floor. After the carriers leave the shake-out area they continue to the molders and the cycle is repeated.

The elimination of so much handling saves time, speeds production and cuts costs. Employee fatigue is reduced greatly because of the reduction of handling and stooping, since the racks are built to the most convenient working height. Far less floor space is needed as the molds are kept moving and poured within a few minutes. Temperature loss of metal is extremely low because the metal is poured nearly as soon as it leaves the cupola.

Top photo illustrates an electrically-driven high-production system for large foundries. Illustration at left shows a simple hand-propelled system for small foundries. Cleveland Tramrail Continuous Foundry Systems have proven advantageous to foundries of all sizes.

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BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy.

**CLEVELAND TRAMRAIL DIVISION**
THE CLEVELAND CRANE & ENGINEERING CO.
1155 EAST 283RD ST. WICKLIFFE, OHIO.

# CLEVELAND TRAMRAIL

## OVERHEAD MATERIALS HANDLING EQUIPMENT

ADD

# Speed and

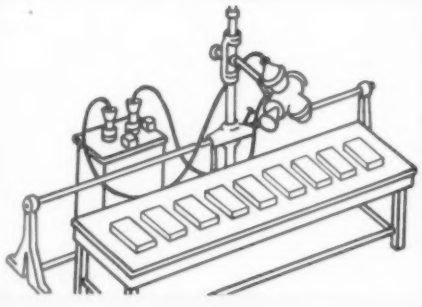
**GET THIS *BOOK* ABOUT X-RAY**

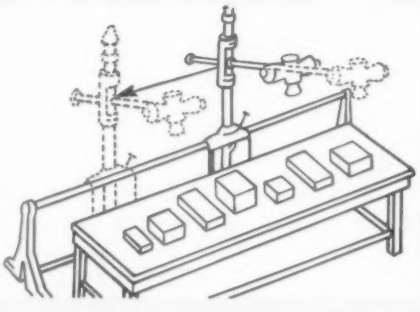
Just out—this book containing wealth of practical, usable information on industrial inspection by x-ray. Tells how x-ray is used; how to select the correct equipment for the job to be done; how to plan and lay out the complete x-ray department. Write for your copy today. Ask for Bulletin B-3159. Address Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., Dept. 7-N.

# Flexibility TO YOUR X-RAY DEPARTMENT

## GET BOTH WITH THIS WESTINGHOUSE X-RAY UNIT

The Westinghouse Rail-Mounted X-ray Unit permits unusual speed and flexibility in the x-ray department. Rated at 140 kv capacity, it is especially suited for the inspection of light alloy parts and moderate thicknesses of heavier metals. Its control is largely automatic . . . easy to adjust for proper exposure.





Check the many features of this 140 kv unit. It will make a profitable investment for your plant, both now and after the war. Your nearest Westinghouse X-ray Office has full details. Or write Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., Dept. 7-N.

### SPEED TO INSPECT MORE PARTS FASTER.

This unit is designed to save time. Parts can be placed on a large worktable and radiographs made, one after the other, simply by moving the unit to the next position. Parts of varying sizes and shapes can be x-rayed quickly, since the tube-head adjusts easily and the controls are simple. When parts are identical, the radiographic work is reduced to sliding the unit along the rails and making successive exposures.

### FLEXIBILITY TO INSPECT MORE KINDS OF WORK.

This unit also has the flexibility demanded in today's production. Ideal for light alloy work, it quickly penetrates aluminum up to 7½" thick. In addition it will produce sharp, detailed radiographs through 1½" of steel; 1" of brass. The counterbalanced tube-head and tube-arm permit the beam to be raised, lowered and directed over a large area with speed and great accuracy. The entire unit occupies a minimum of floor space, a large part of which is available for positioning the work.

J-02012

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

# MACKLIN
## GRINDING WHEELS

THAT WHEEL YOU RECOMMENDED HAS ELIMINATED OUR BOTTLE-NECK AND NOW OUR PRODUCTION IS REALLY GOING TO TOWN
THATS MY JOB "PROTECT YOUR PRODUCTION"
MACKLIN FIELD ENGINEER

Macklin Grinding Wheels are made in all sizes and shapes for every type of grinding job. An experienced Macklin Field Engineer is available at all times for the asking—no obligation.

DON'T TAKE BONDAGE - INVEST IN WAR BONDS

## MACKLIN COMPANY

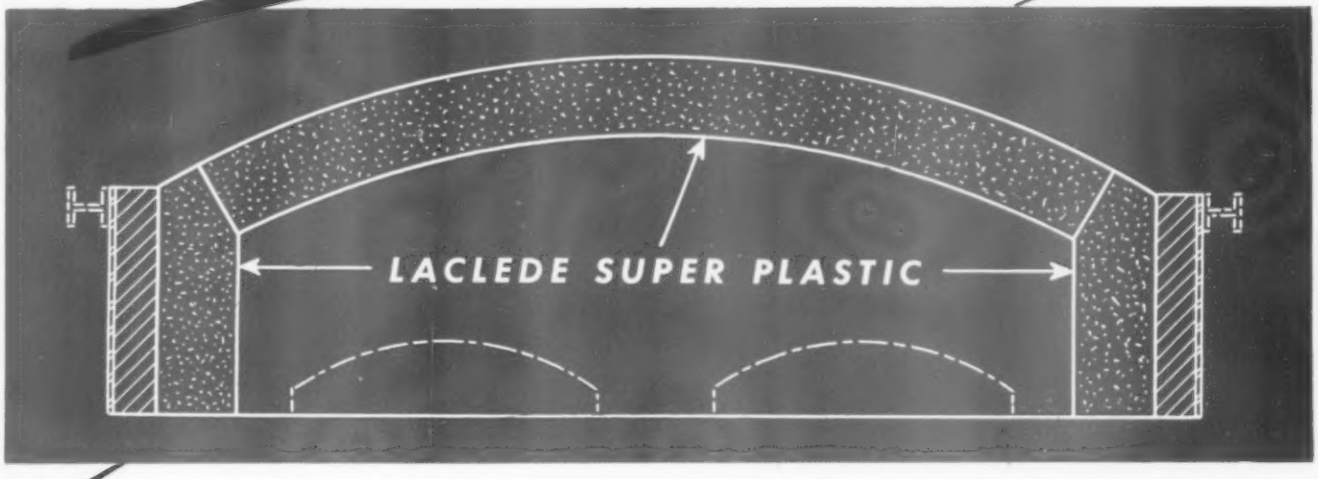
*Manufacturers* of GRINDING WHEELS — JACKSON, MICHIGAN, U. S. A.

Distributors in all principal cities

*Sales Offices:* — Chicago - New York - Detroit - Pittsburgh - Cleveland - Cincinnati - Milwaukee - Philadelphia

# Want a Forge Furnace Lining That Will Save Precious Operating Hours . .

## At No Extra Cost?




**LACLEDE SUPER PLASTIC (PCE 35-36)** with a fusion point of 3326° F.—3362° F. will withstand these destructive conditions encountered in the forge furnace:

- **High operating temperatures**
- **Slag action**
- **Severe jolting and vibrating action**
- **Temperature changes (thermal shock)**
- **Mechanical battering**

The high PCE alone enables Laclede SUPER PLASTIC to resist most of the destructive effects of these operating conditions. The high grade materials, properly balanced, give Laclede SUPER PLASTIC the qualities that make it the ideal material for Forge Furnace Linings that last longer, cut labor costs, reduce maintenance expenses, and save time.

**SUPER PLASTIC** is furnished sliced, in 100 lb. moisture-proof cartons or in 250 lb. or 500 lb. air-tight metal drums. Send for complete engineering data today.

**LACLEDE ENGINEERING SERVICE**—When you have a problem involving refractories, call in a Laclede-Christy engineer. Because Laclede-Christy offers a *complete* line of refractories, he will give you an unbiased recommendation—the *right* recommendation for your job. Complete blueprints and estimates will be furnished without cost or obligation—supervision if required.

Consult the classified section of your 'phone book or write for the name of your nearest Laclede-Christy representative.

LACLEDE-CHRISTY FOUNDED 1844 ST. LOUIS, U.S.A.

**LACLEDE-CHRISTY**
**CLAY PRODUCTS COMPANY**
**Ambassador Bldg., St. Louis, Missouri**

*World's Largest and Most Diversified Line of High Temperature Refractory Specialties*

# HAYNES *equipment*

## BRASS FURNACES

Tilting or stationary. Simple cover lifting mechanism, 2" cold rolled shaft, cast steel cross head, 3/8" rods and turnbuckles for adjusting cover. Made in any size required. 6" machined trunnions rest in chilled face bearings in the legs which are bolted to channel iron base braced with steel bars to eliminate side motion. Gear box and gears adjustable to take up any loose play due to wear. Furnace is complete welded shell equipped with special Haynes burner designed to save nearly one-fourth your oil. Equipped with a General Blower unit.

## JOLT SQUEEZER

This machine has a 10" squeeze cylinder, 3" jolt cylinder, 17" x 20" jolt table. Sturdily built throughout—no bolts or screws. Post and jolt cylinder cast in one piece. Arm swings on 2-7/16" cold rolled shaft. Zerk fittings on all moving parts. Comes completely equipped with vibrator, riddle rack, set-off board, air gauge, pop-off gauge and pin for gate horn.

## WORM GEAR LADLES

Haynes Worm Gear Ladles are manufactured in all sizes. Welded bowls, cast steel trunnions with "V" bail. Gears completely enclosed. Zerk fittings on all moving parts. Bail is made from 3" x 1" steel.

## CORE OVENS

The Haynes Core Oven has 2" insulated walls. Front, top and bottom pressed steel eliminating breakage. Cast iron fire box for Coke, Oil or Gas. Five rolling shelves, one 10" high and four 7" high. Shelves make complete half turn closing oven while shelves are being loaded. Height 51", width 54", greatest depth of shelf 27". Weight approximately 900 lbs. Firebox height 16", depth 15", width 14".

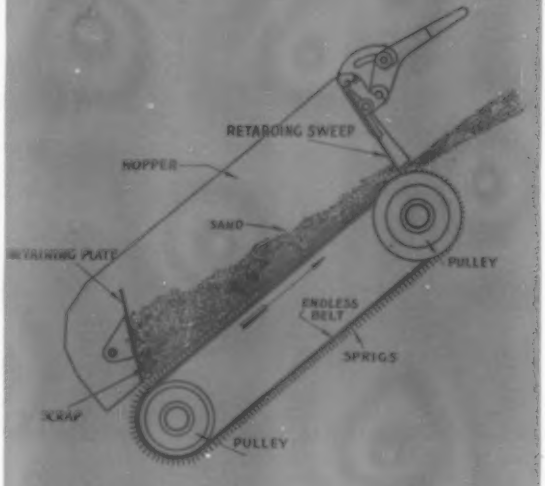
*Send for detailed information and prices. Prompt deliveries.*

## HAYNES FOUNDRY EQUIPMENT CO.

**1734 LAKE STREET** **KALAMAZOO, MICH.**

# Royerized Sand

## Gives You Smoother Casting Finish — Lower Cleaning Costs — Less Discount




### How The Royer Operates

The sand (shoveled or conveyed into the hopper) falls upon the Royer combing belt. The steel sprigs or teeth on the belt comb the sand into a granular condition. The thorough mixing and blending of the sand is due to the spacing of the sprigs, the speed of travel and the action of gravity. The sand is aerated twice: on the belt, and when it is automatically discharged onto the heap. Scrap, core fragments and other refuse are removed by gravity.

all of which are of special importance today, when the war effort depends on foundry production to such a large extent.

No matter what the condition of the heap sand that is fed into a Royer Sand Separator and Blender, it comes out open, thoroughly mixed and refuse-free — the kind of sand that makes true-to-pattern molds. Royer users get smoother finished castings with less scabs and roughness. And castings not only look better, but take much less time in the cleaning room.

Royer-prepared sand cuts discount losses because run-outs, drops, surface inclusions and rough finish — largely caused by poorly conditioned sand — are completely eliminated.

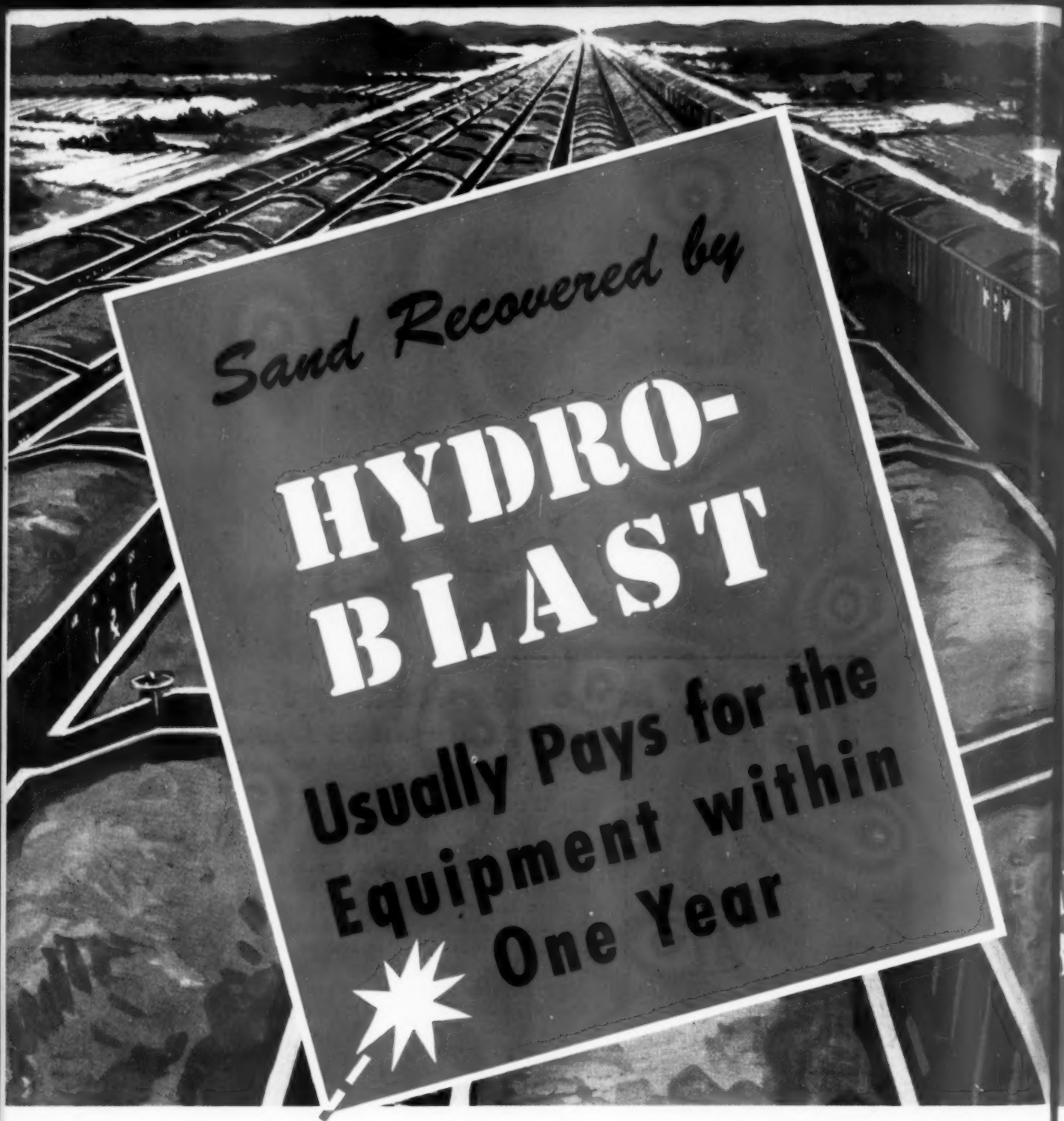
Over 5,000 Royers are in use today. Eight stationary and portable models, with capacities from 5 to 50 tons per hour, are available for ferrous and non-ferrous jobbing foundries. Special units for the sand conditioning circuits of production foundries.

*Royer equipment is sold only by experienced, factory-trained engineers, who are qualified to advise you on the type of unit best suited to your conditions.*

Write for full information, including delivery dates, on your priority requirements.

THE ROYER

**ROYER FOUNDRY & MACHINE CO. KINGSTON, PA.**




Almost every foundryman knows that Hydro-Blast cleans castings faster, better and at lower cost. Most foundrymen know that Hydro-Blast pays for itself within one year through the recovery, reconditioning and return to the heap of formerly wasted sand. Few foundrymen know that by taking advantage of Hydro-Blast's exclusive economies they are making a direct contribution to America's war effort.

Let us accept or reject Hydro-Blast's claims to superior cleaning—the removal of foreign matter from the castings even to imbedded sand particles not ordinarily visible to the naked eye—particles which frequently set up an abrasive action very detrimental to moving parts.

Let us completely overlook Hydro-Blast's recovery of formerly wasted sand, in better than new condition; even though this form-

erly wasted sand is returned to the heap by Hydro-Blast at less than 75 cents per ton including labor, power, water and maintenance.

Let us concentrate on Hydro-Blast's saving of manpower and transport ton miles which justify in themselves the investment required for this modern-day foundry mechanism. Hydro-Blast and two unskilled laborers perform the back-breaking work of ten chippers. Hydro-Blast can save 75% of your presently necessary freight cars, barges and dump trucks used to handle sand to, from and within your foundry.

Hydro-Blast installations may be seen at your request upon approval of the War or Navy Departments.

**HYDRO-BLAST Corporation**
2550 N. WESTERN AVE., CHICAGO

THROUGHOUT American industry, Staynew Filters increase production, reduce maintenance. More guns, planes, tanks, ships, shells, trucks, and war materials of every kind are produced and moved faster to the fighting fronts because Staynew Filters are on the job.

At the fighting fronts, Staynew Filters add to the deadly efficiency of American weapons. Many a U. S. fighting man today owes his very life to the greater fire-power, speed, efficiency, or reliability of Staynew-equipped instruments of war.

After Victory, Staynew Filters will again help peacetime industry produce better, cheaper, faster.

## Partial List of Staynew Filters and Their Direct Application to America's War Effort

**STAYNEW INTAKE FILTERS** help maintain maximum performance of tank, truck, and marine engines by preventing the intake of abrasive dust.

PROTECTOMOTOR AIRCRAFT-TYPE FILTER CELL →

CIRCULAR TYPE AIR INTAKE FILTER

**STAYNEW INTAKE FILTERS** (Aircraft-type) help maintain a sufficient supply of clean air to aircraft carburetors and engines.

**STAYNEW LIQUID LINE FILTERS** add to long life and reliability of internal combustion engines for airplanes, tanks, trucks, and naval vessels by removal of gritty particles and carbon from fuel and lubricating oils. These filters speed war production by removing foreign matter from coolant oils; they guarantee clean water in the field for photo-processing; they are capable of handling algae-bearing water.

MODEL CPHLS LIQUID LINE FILTER

**STAYNEW OIL VAPOR ARRESTORS** prevent oil from crankcase breathers reaching blades of engine turbo-chargers; also prevent oil from the discharge of rotary or other types of compressors damaging or fouling accessory apparatus and control mechanisms.

A B

A—Model CPH Oil Vapor Arrestor.
B—Model CP Aircraft-type Oil Vapor Arrestor.

**Automatic Type Ventilation Filter**

**STAYNEW FILTERS** for building ventilation, including automatic and dry panel types, are contributing everywhere to the continuity of service of both men and machines.

BUILDING AIR-SUPPLY FILTER

**Have You A Filter Problem?**

The broad experience of Staynew engineers is proving invaluable in solving war industry problems. This experience, product of more than 22 years of exclusive filter manufacturing, is yours for the asking.

**OVER ONE MILLION STAYNEW FILTERS PLACED IN SERVICE**

**STAYNEW FILTER CORP.**

PROTECTOMOTOR AIR FILTERS

"Filter Headquarters"

36 FILTER PK., ROCHESTER, N. Y.

KELEKET
X-RAY
ARMY
E
NAVY
THERE'S a new flag flying over our plant—our distinguished service medal—the Army-Navy "E" Award for excellence in war production.
Quietly, traditionally, KELEKET performs the job assigned — and in the performance makes a "major contribution to victory."
THE KELLEY-KOETT MFG. CO.
212 West Fourth St. . . . . Covington, Ky.
PIONEER CREATORS OF Quality X-RAY EQUIPMENT SINCE 1900

# SPEED PRODUCTION

*with*

# FANNER

## CHAPLETS AND CHILLS

★

ACCURACY

★

CHOICE MATERIALS

★

ANY SHAPE, SIZE OR STYLE

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*The Most Dependable Source*

## THE FANNER MANUFACTURING CO.

BROOKSIDE PARK — CLEVELAND, OHIO

CANADIAN FANNER, LTD.
HAMILTON, ONTARIO

# DAVENPORT PIN-LIFT

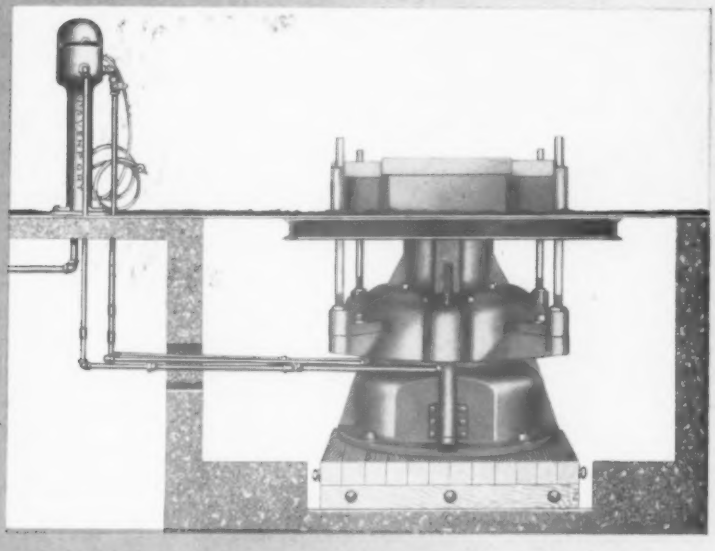
## *Draws a Beautiful Cope*

"DAVENPORT" PIN LIFT, Model AJS 40 jolted and ready for the draw.

"DAVENPORT" PIN LIFT, Model AJS 40 smooth, steady, clean draw.

"DAVENPORT" PIN LIFT, Model AJS 40 Another draw of a complicated pattern.

Five men pour aluminum to cast a 35-lb. bomber turret top.



"DAVENPORT" PIN LIFT, Model AJS 40 Pit type sectional view.

## MODERN "DAVENPORT" MOLDING MACHINES

You will find "Davenport" modern molding machines working on war jobs wherever the foundry problems are hard, tough and difficult.

Where steel, malleable, and gray iron, also magnesium and other non-ferrous metals are being poured into castings you will find "Davenport" molding machines doing their part to speed up war production.

Victory must come first—but we ask you: after this war will your foundry be equipped with the best to meet world-wide competition? NOW IS THE TIME TO PREPARE FOR PEACE.

**"DAVENPORT" LINE OF MOLDING MACHINES**

**JOLT ROLLOVER DRAW MACHINE**
Model SA (Seven sizes)—Capacity from 750 to 12,000 lbs.
Model A (Six sizes)—Capacity from 1,000 to 12,000 lbs.

**JOLT STRIPPER OR PUSH-OFF MACHINES WITH ADJUSTABLE LIFT PINS**
Six sizes—Capacity from 1,000 to 10,000 lbs.

**PLAIN JOLT MACHINES**
Fourteen sizes—Capacity from 200 to 25,000 lbs.

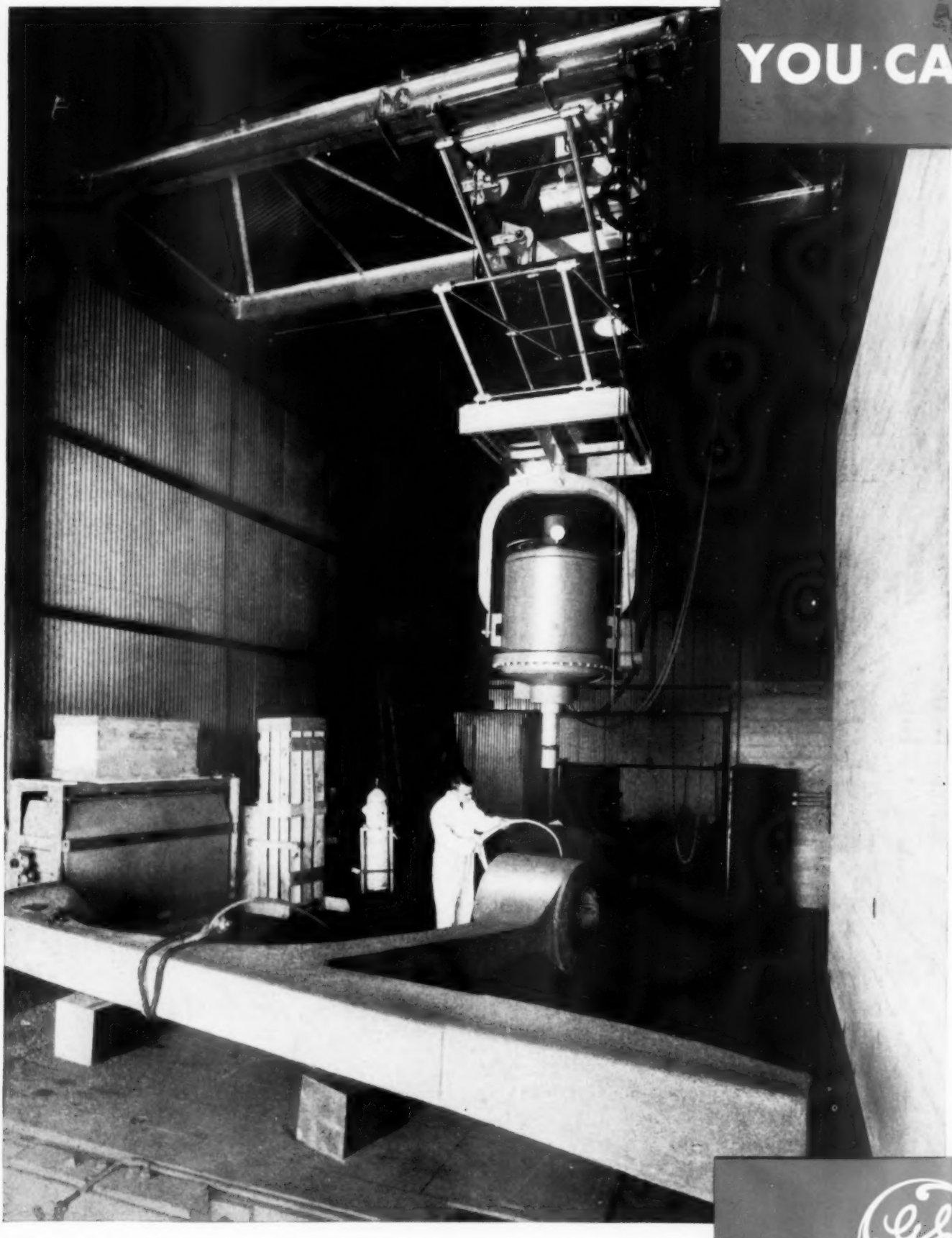
Send for our catalog. Choose modern equipment. Although deliveries are slow, place your order today. Be prepared for peace.

# DAVENPORT

**MACHINE & FOUNDRY CO.**

**Davenport** **Iowa, U. S. A.**

YOU CAN



WORLD'S MOST POWERFUL *is this G-E one-million volt industrial x-ray unit. Mounted on a traveling overhead bridge crane, this unit provides unusual flexibility to expedite the handling and radiography of large castings of various metal thicknesses—from one inch on up. Fast, safe, shockproof, it is but one unit of the complete line of G-E Industrial X-Ray apparatus.*

# Save Time, Insure Quality, Cut Rejects

## Here's How G-E X-Ray Can Help You

G-E X-Ray offers you a complete line of shockproof, climate-proof industrial x-ray apparatus — with a full range of power of up to and including one-million volts — in a wide variety of types to meet every requirement. It also offers you the services of its corps of experienced industrial x-ray engineers who will help you select just the right unit and method to meet your particular need.

Thus, if you manufacture munitions and material vital to victory, and you require x-ray in your inspection facilities, G-E X-Ray offers you an unbeatable combination of experienced men and thoroughly-tested machines. It's a combination that you can rely on to *save time*, *insure quality*, and *cut rejects*.

**G-E X-Ray men and machines will help you**

**SAVE TIME** because G-E Industrial X-Ray Engineers — first to apply x-ray to industrial inspection more than 20 years ago — have an intimate knowledge of modern manufacturing methods and problems. There will be no guesswork about their recommendations; they'll give you facts and figures that you can rely on.

G-E Industrial X-Ray Units are plus-powered to provide fast, accurate x-ray service. Their full flexibility saves priceless operating time, and their controls are easy to operate accurately. Unlike ordinary x-ray apparatus, G-E Industrial X-Ray Units are designed and built to withstand the rigorous service expected of heavy industrial apparatus. And they'll take heavy duty cycles in their stride hour after hour, day in and day out. Whatever your x-ray need, there's a G-E unit that will take care of it best.

**G-E X-Ray men and machines will help you**

**INSURE QUALITY** because, with a G-E Industrial X-Ray Unit in your plant, you can gain the benefits of using x-ray as a guide to the development and control of improved casting techniques. An important item when you consider that improved techniques have resulted in doubling the yield from a single melt, and reducing to almost nothing the cost of replacing defective castings not quite up to standard. Quality is far more important today than ever before — and you can insure it without sacrificing production time when there's a G-E X-Ray Unit on the job.

**G-E X-Ray men and machines will help you**

**CUT REJECTS** because with a G-E Industrial X-Ray Unit you have available a reliable guide for the repair, by welding, of large expensive castings. While a single fault in the internal structure of the metal may render an expensive casting unfit for the particular use for which it was designed — the fact that you find the flaw is not a signal for discard! The x-ray film that reveals the flaw is also an accurate guide to its repair.

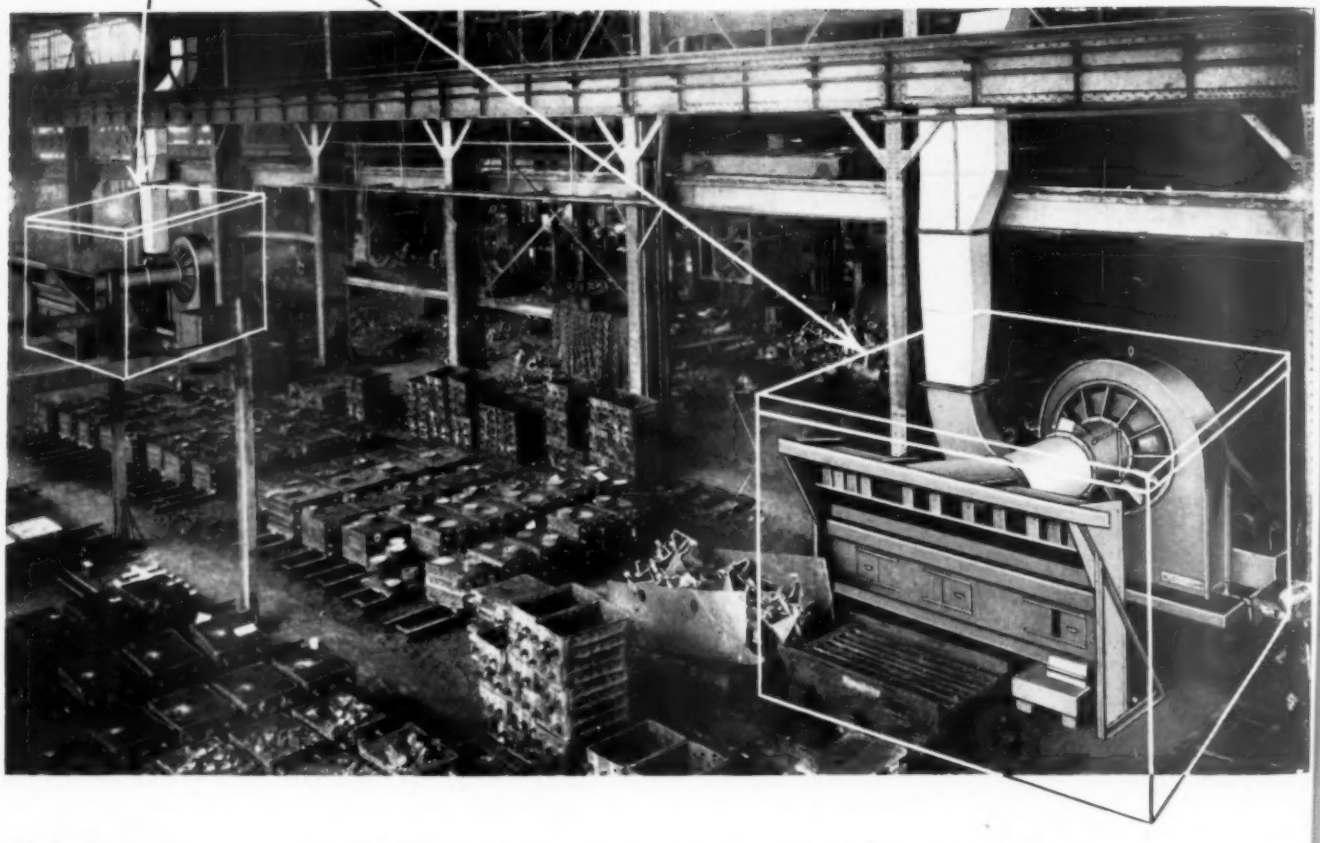
There are sound reasons why the majority of the nation's leading industrial concerns who use x-ray inspection have selected G-E Industrial X-Ray apparatus — reasons that you will be interested in. To get complete information about G-E Industrial X-Ray Units, call in an experienced G-E Industrial X-Ray Engineer to help you apply x-ray to your problem.

To request the services of G-E Industrial X-Ray Engineers, write or wire, today. Address your request to General Electric X-Ray Corporation, 2012 Jackson Boulevard, Chicago, Illinois. Department N-35.

**Films, Film-Processing Chemicals, Screens, Cassettes, and other accessories to make G-E's the world's most complete single-source x-ray supply line—available from 35 direct factory branch offices.**

**GENERAL ELECTRIC X-RAY CORPORATION**

# ROTO-CLONE *Packaged* DUST CONTROL *for Large Shakeouts*



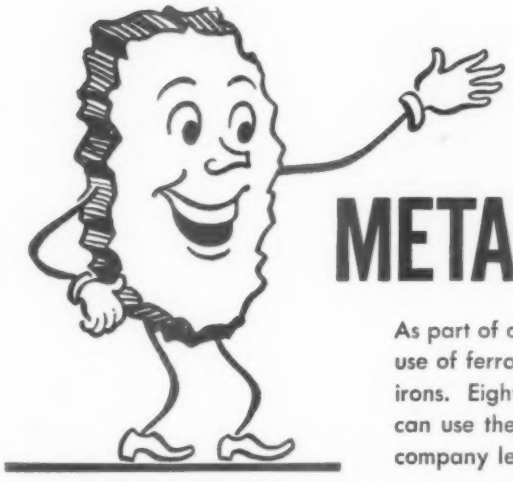
DUST control at the shakeout is greatly simplified by the Type W Roto-Clone (Arrangement A) and a specially AAF designed Dust-Hood. Wherever overhead cranes deliver flasks to the shakeout as in the large steel foundry above, this Roto-Clone and Dust-Hood combination is ideal because of its space saving feature combined with highest overall efficiency.

Note that the dead area between the shakeout and crane columns is sufficient to accommodate the Roto-Clone combination unit. The Roto-Clone requires no Precleaner, and the collected dust is sluced to a catch basin under the floor, from which the water is drained off.

Write for complete information on the application of Roto-Clone to all foundry dust problems including shakeout, sand handling, mullers, screens, tumbling mills, abrasive cleaning, grinders, etc.

AMERICAN AAF AIR FILTERS

**AMERICAN AIR FILTER COMPANY, INC., 266 CENTRAL AVE, LOUISVILLE, KY.**
INCORPORATED
IN CANADA, DARLING BROTHERS, LIMITED, MONTREAL, P. Q.



# Help Yourself To METALLURGICAL Information

As part of our service to the foundry industry we publish literature describing the use of ferro-alloys in the foundry, and the advantages and applications of alloy irons. Eight booklets from our literature library are briefly noted below. If you can use the information supplied by any of these booklets, write for it on your company letterhead. Please refer to the form number in your request.

BRIQUETTED ALLOYS
FOR THE CAST IRON FOUNDRY
Foundry Control Methods In Making Uniform Cast Iron
SMZ ALLOY AND ITS USES
AS A LADLE ADDITION TO CAST IRON
ABRASION-RESISTANT
HIGH-CHROMIUM IRON
USING FERRO-ALLOYS IN THE IRON FOUNDRY
Electromet
CHROMIUM
IN CAST IRON
Chill Tests for Controlling Quality of Cast Iron

***Chromium in Cast Iron*** gives data relating to the properties, production, and uses of chromium cast iron. A bibliography is included. 48 pages Form 2465

***Briquetted Alloys for the Cast Iron Foundry*** explains the advantages of briquetted alloys and describes the effects of the more important alloys upon the components of cast iron. Graphs and tables serve as illustration. 16 pages Form 3465A

***Abrasion-Resistant High-Chromium Iron*** is a general discussion of the properties chromium imparts to iron and how those properties are of service to industry. 8 pages Form 4988

***Using Ferro-Alloys in the Iron Foundry*** discusses the effects of alloying elements in cast iron and the most satisfactory methods of adding the alloys in the foundry. 4 pages Form 3478

***Chill Tests for Controlling Quality of Cast Iron*** defines chill tests, outlines their uses, their forms, the effects of alloys on chill depth, and the best methods of chill control. 8 pages Form 5091

***Foundry Control Methods in Making Uniform Cast Iron*** outlines foundry-control methods now being used in making castings, particularly by the cupola process. A bibliography is included. 14 pages Form 5059

***SMZ Alloy and Its Uses*** describes the SMZ ladle-addition alloy developed by metallurgists of Electro Metallurgical Company for improving cast iron. Tables, graphs and photographs serve as illustration. 12 pages Form 4604A

***Electromet Products and Service*** lists the Electromet ferro-alloys and metals we produce. Each grade is described briefly, and suggestions are offered for its application in steel plants, and in both ferrous and non-ferrous foundries. 24 pages Form 2165B

• • •

Distribution of useful literature is only one part of a broad service program, which includes on-the-job advice from Electromet technical men, and an active research program in the development and specialized applications of ferro-alloys. If you have a problem in the selection or use of ferro-alloys consult Electromet metallurgists. There is no obligation.

Electromet Ferro-Alloys and Metals are available through offices of Electro Metallurgical Sales Corporation in Birmingham, Chicago, Cleveland, Detroit, New York, Pittsburgh, and San Francisco.

**Electromet**
Trade-Mark
**Ferro-Alloys & Metals**

**ELECTRO METALLURGICAL COMPANY**
*Unit of Union Carbide and Carbon Corporation*
UCC
30 East 42nd Street, New York, N. Y.
In Canada: Electro Metallurgical Company of Canada, Ltd., Welland, Ontario

"Electromet" and "SMZ" are registered trade-marks.

# THERE'S NO RATIONING

## OF RAMMING WITH A

# SPEEDSLINGER

Today, every casting in American foundries is an important casting because most foundry products fit somewhere into the vast war effort of the United Nations. Production delays may retard the flight of a Flying Fortress over enemy territory; a tank may miss the boat for Murmansk; the launching of a vitally essential ship may be postponed; all of these things can happen because of inadequate ramming capacity.

But there's no waiting on a *Speedslinger* which is capable of ramming 1,000,000 pounds of sand in eight hours—harder than foundry sand has ever been rammed before. An important manganese steel foundry operating two Motive Type *Speedslingers* says: "One of our castings which weighs 4,300 pounds formerly required two molders and two helpers two days to produce. With the *Speedslinger*, one molder and one helper produce this job in one day with a thirty percent saving of gaggers."

## THE BEARDSLEY & PIPER CO.

# THERE'S NO RATIONING

## OF SAND WITH A

# *SPEEDMULLOR*

Every foundryman knows the importance of thoroughly aerated sand. The *Speedmullor*, most modern mulling mechanism available, is the only mullor that mulls, removes fines, aerates, presses, agitates and cools hot sand during the regular mulling cycle, and without costly accessories. The *Speedmullor* will cool the sand from the highest temperatures to 5 degrees above room temperature during a 1½ minute mulling cycle.

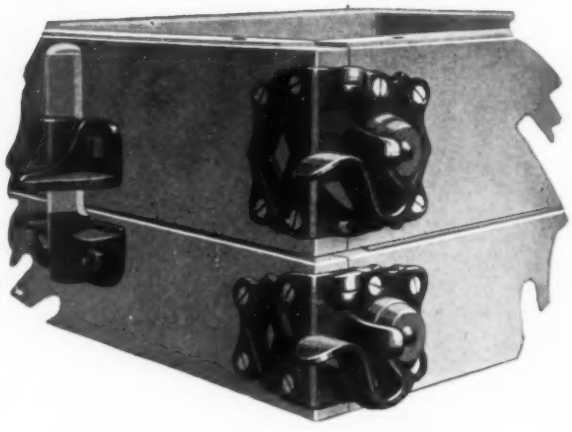
The *Speedmullor* is sensationally faster because all of the batch is pressed, agitated and aerated in suspension on the wall of the bowl—an exclusive *Speedmullor* feature. High pressure is developed through centrifugal force so that the sand is squeezed between the wheels and the wall which are both rubber-surfaced. Mulling and bonding action takes place within the sand itself because the sand cannot slip on the rubber surfaces. More agitation and aeration take place because the speed of the plows keeps the sand in suspension at all times. These advantages are the result of modern design.

2541 N. Keeler Avenue, Chicago, Illinois

# A *Real* INVESTMENT FOR MORE PRODUCTION!

## DIAMOND FLASKS

*No matter what happens*—you'll never be wrong if you equip for production with *good* flasks. Because we can give you many exclusive features in a flask developed over a period of 50 years, it can also be said that, "You can't go wrong on a Diamond," either. Note these important features:



■ **A SUPERIOR LATCH (exclusive)**

It's self-compensating for wear. The tighter you draw it, the firmer the grip. Has special cam which is easily adjustable as extreme wear on parts develops. Only *Diamond* has this patented feature.

■ **PRECISION-MADE**

Made from the finest grade of well-seasoned cherry stock, all flasks are made to precise measurements according to your specifications.

■ **A PATENTED HINGE (exclusive)**

Note the construction of Diamond hinges. The lugs are carefully milled and are interlocking which eliminates "play" no matter how long or how hard the flask is used.

■ **SPECIAL SHAPES**

We regularly supply customers with special shape flasks, including round flasks, and special cut partings.

## STEEL JACKETS

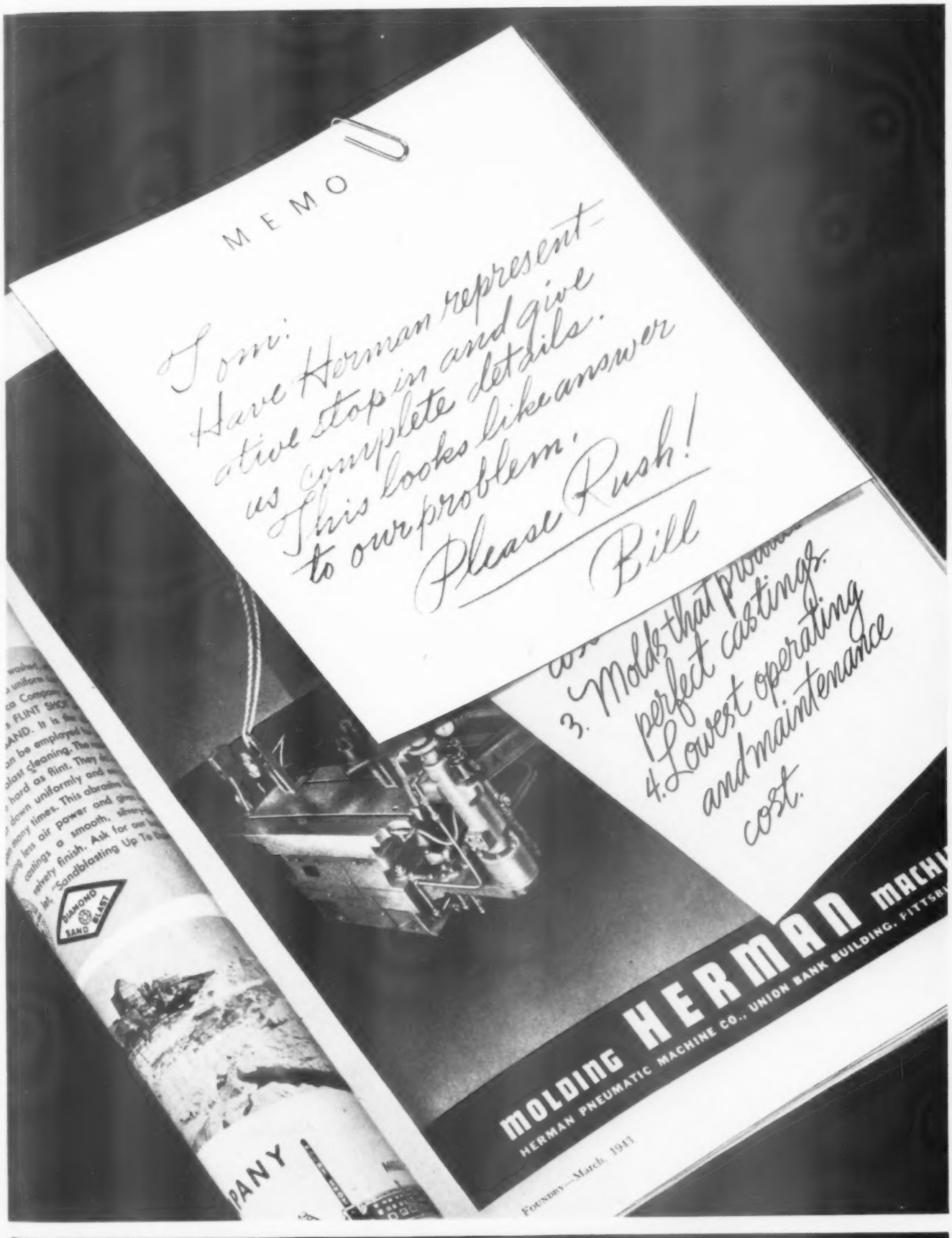
Made from Nos. 7 to 10 gauge steel, true to size and taper. Are practically indestructible, and retain their shape under severest conditions. Thousands of these jackets in use.

# DIAMOND

## CLAMP AND FLASK COMPANY

**Telephone 2553** **Richmond, Indiana**

***Designers of* CORE PLATES, JACKETS, BANDS, FLASKS *since 1889***


MEMO
Have Herman representative stop in and give us complete details. This looks like answer to our problem.
Please Rush!
Bill
3. Molds that produce perfect castings.
4. Lowest operating and maintenance cost.
MOLDING HERMAN MACHINES
HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH, PA.
FOUNDRY—March, 1943

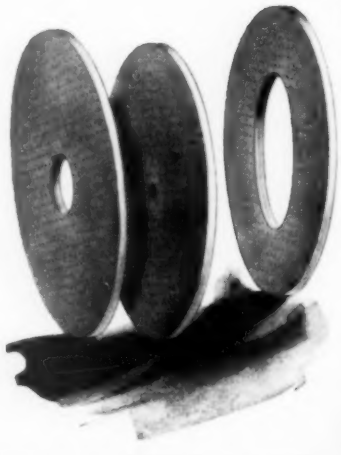
**MOLDING HERMAN MACHINES**

**HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH, PA.**

# This Merry-go-round has gone to war!

1. It takes a lot of parts to make a Jeep. And this "merry-go-round" has the job of grinding some of those parts (those with flat surfaces)...in a hurry! By rotating a large number of pieces beneath a Carborundum made disc wheel, it surface grinds them in a fraction of the time required by older methods. This process is one which Carborundum helped develop.

2. Surface ground parts for jeeps, tanks and other weapons just couldn't be finished one at a time; production would be hopelessly low. The introduction of disc wheels and the "merry-go-round" surface grinder put surface grinding on a real mass production basis. The method can be used to generate flat surfaces to precision tolerances, on smallest pieces or on massive forgings and castings. It speeds production of many vital war items from valve springs to connecting rods, from piston rings to clutch plates!



3. Careful supervision of grinding operations is vital today to conserve materials and time. The abrasive disc wheel is a "Weapon of Production" and should be properly used for maximum effectiveness. The Carborundum Company, Niagara Falls, N. Y.

Carborundum is a registered trade-mark of and indicates manufacture by The Carborundum Company.

# HE DUST FROM 24 GRINDERS

is pictured the many
gbenches in the area
by the Mahon Hydro-
Dust Collector illustrat-
ow. 26 additional Hy-
am Collectors clear sim-
ees and deposit the
l abrasive aluminum
fely under water. Com-
they have a total ca-
of 725,000 cubic feet
ute.

## INTO 1 Hydro-Foam DUST COLLECTOR

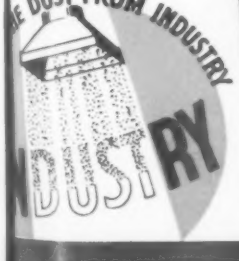
**(trapped and converted into harmless sludge)**

**This large midwestern plant, devoted to the manufacture of aluminum airplane propellers, initially installed seven Mahon Hydro-Foam Dust Collectors. So remarkable was the efficiency and economy of their operation, twenty additional units have since been added. The dangerous grit and dust from hundreds of grinding operations now is whisked away from working areas and deposited in the bases of the several Collectors in the form of harmless sludge. Completely automatic throughout even to sludge removal. Other than the suction exhaust fan, there are no moving parts to wear out or cause trouble. No pumps. No spray nozzles. No cloth screens.**

*The Mahon Hydro-Foam principle of dust collection is equally as applicable to other manufacturing processes where dust is a hazard to health and production. Whatever your business—metal working, foundry, glass, brick, chemical, paint, etc.—this modern method of dust control will serve you effectively and with greater economy. Write for descriptive folder.*

**HON PRODUCTS**
**w Serving in**
**ar Production**

Cleaning Machines,
roofing Machines, Hy-
lter Spray Booths, Fil-
Air Supply Systems,
— including Drying,
, Core and Box Types,
-Foam Dust Collectors,
ete Finishing Systems
ny Other Units of Spe-
rocessing Equipment.




THE R. C. **MAHON** COMPANY

DETROIT CHICAGO

# Adams Cherry Slip Flasks—

## *The Ideal Combinatio*

When you buy an Adams Cherry Slip Flask, you not only get a combination of the finest materials and expert workmanship, but you also get a custom-built job to your exact specifications.

Close-grained cherry lumber, thoroughly air dried, is used exclusively, and all corners are machine locked.

Pins to suit your preference—wide-V, double-V, round, double round or special types, accurately machined on bearing surfaces.

The sand strip mechanism is convenient and quick-acting, and it will stand up under the jolting and squeezing of power machines.

Our facilities have kept pace with increased demand, and we can give your requirements prompt attention.

**THE ADAMS COMP**

*MOLDING MACHINES · FLAS*

# s—Adams Cast Iron Jackets

## tio*rom Every Standpoint*

Used in combination with the Adams Cherry Slip Flask or the Adams Cherry Snap Flask, these jackets form a combination that cannot be excelled for convenience and for economical production.

Great strength and rigidity with minimum weight are assured by the combination of horizontal and vertical corrugations. Inner surfaces are accurately surface ground, and assembly is made on a fixture to exact size and to assure correct taper in the case of tapered jackets.

If you prefer steel jackets, we have them also. Regardless of your preference, specify Adams Jackets for proper mold protection.

**P Y · DUBUQUE, IOWA · U.S.A.**

**S QUIPMENT** *Established 1883*

# *Compressors, too, are working hard these days—*

## PROPER LUBRICATION IS MORE IMPORTANT THAN EVER

Built into Chicago Pneumatic horizontal stationary compressors are force feed cylinder lubrication and a highly efficient flood system of frame lubrication. These lubricating systems require only minimum attention on the part of the operator —a few simple check-ups which, however, should be made regularly.

Additional suggestions for maintaining compressor efficiency will appear in future advertisements. Watch for them.

### HOW TO GET MAXIMUM OPERATION FROM YOUR CP COMPRESSORS

Bearings will not run without oil. Keep oil in crank case at level indicated on oil level gauge (illustrated). Drain, clean, refill reservoir at least once a month — more frequently if local conditions require.

← At least once a day, check the force feed cylinder lubricator, making sure reservoir is filled to required level. Make certain that lubricator is feeding only the number of drops per minute recommended for your particular size of compressor — too much oil results in carbon formation and overheating.

★★★★★★★★
PNEUMATIC TOOLS
ELECTRIC TOOLS
(Hicycle...Universal)
ROCK DRILLS

CHICAGO PNEUMATIC
TOOL CP COMPANY
General Offices: 8 East 44th Street, New York, N. Y.

★★★★★★★★
AIR COMPRESSORS
VACUUM PUMPS
DIESEL ENGINES
AVIATION ACCESSORIES

# Ransohoff

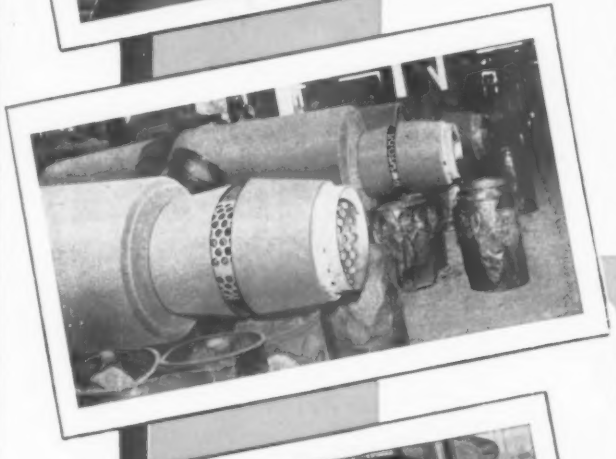
## Tumbling Mills save as much as 66 2/3%

A broad statement? Not at all, because it is substantiated in scores of foundries from coast to coast. Records showing comparisons between old-fashioned methods and the Ransohoff Method prove conclusively that it is unnecessary to waste time and money in your cleaning room. And today when the foundry is playing such a vital part in the all-out effort the clock and production costs may mean the difference.

*Quicker and Better Tumbling with*
*THE RANSOHOFF WET METHOD*

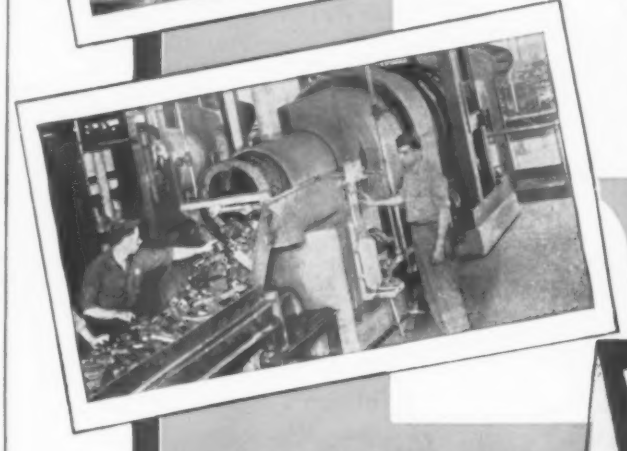
Castings cascade in a mass in which stars are intermingled thoroughly. All voids are filled completely. Stars vary in size and shape. This results in very rapid cleaning without nicking, breaking or excessive wear on mill lining. Stars enter and return automatically. Replacement costs are at a minimum. Wet method eliminates dust and dust collectors, reducing health hazards.

Side-loading, side-unloading wet mill. A hot solution is pumped through the mill while tumbling, clear rinse solution pumped through while stars are returning. Castings discharged on chute to sorting table.



Tumbling piston rings castings after molding and before machining, about 20 minutes per batch. Additional screen for separating polywogs or risers. Same mill used also in production and job foundries.

Ransohoff Automatic Star-Return Tumbling Mills are Speedy, Gentle; Stars are handled automatically throughout.

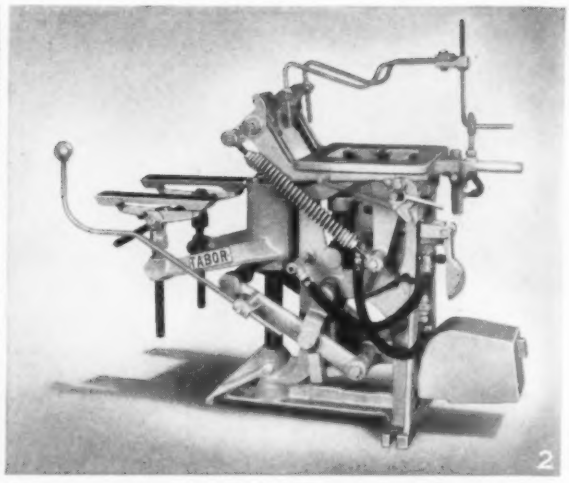


End-loading, end-unloading mill. Castings cleaned twice, before sorting and grinding, after sorting and grinding, ready for plating. Discharges onto inspection conveyor table. Power loader in pit.

**N. RANSOHOFF, Inc.**
TOWNSHIP & BIG 4 RR
CINCINNATI, OHIO

TABOR
TRADE 1884 MARK

1



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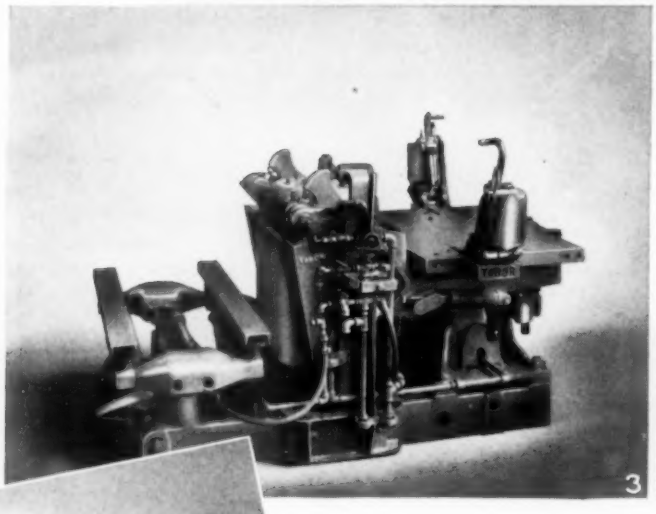

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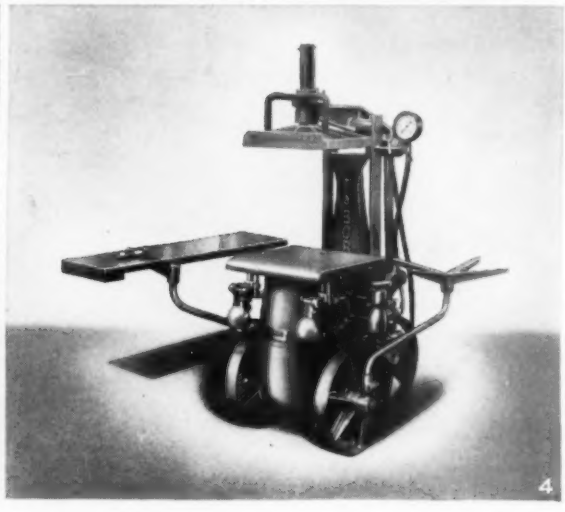
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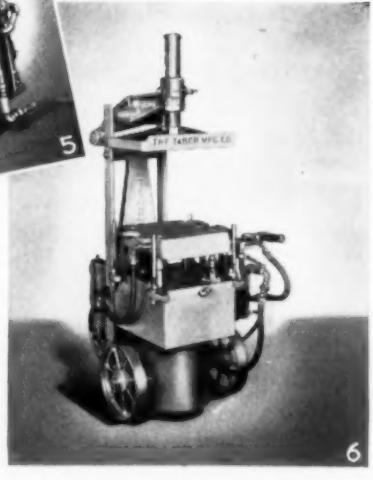


6

# TABOR FOUNDRY MOLDING MACHINES

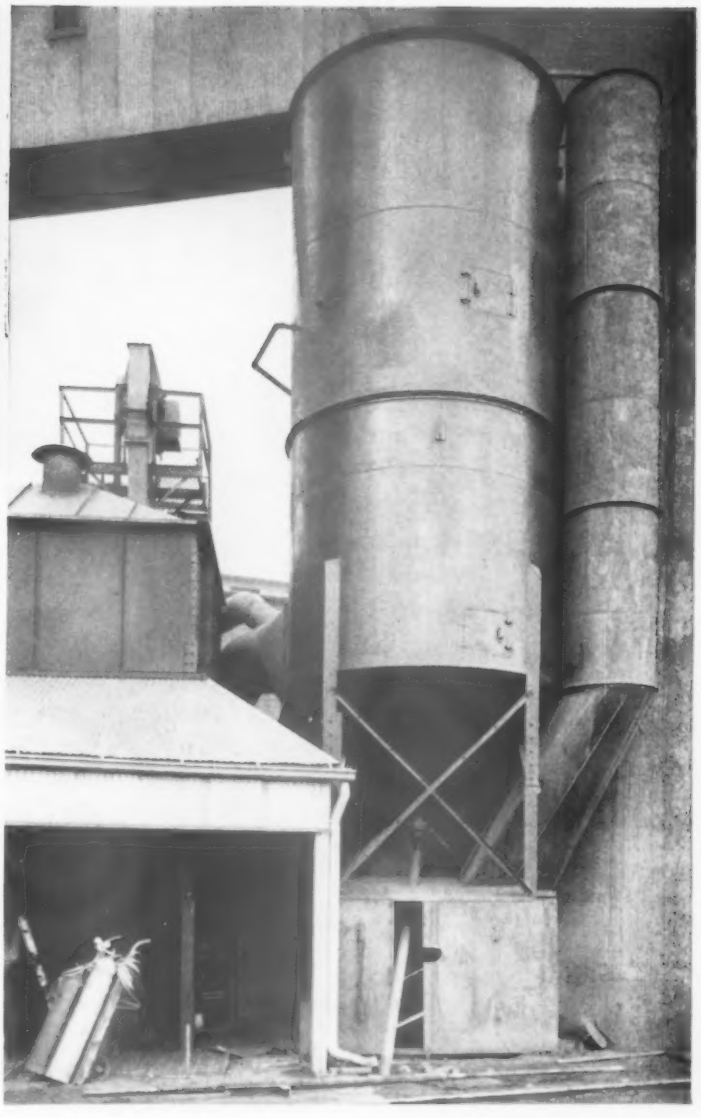
1. **JAR SQUEEZER—Yoke Type**
2. **JAR-RAM HAND ROLLOVER HAND DRAW MACHINE**
3. **JAR POWER ROLLOVER POWER PATTERN DRAW MACHINE—with air operated flask clamps.**
4. **JAR SQUEEZER—Cantilever Type**
5. **JAR SQUEEZE FLASK-LIFT MACHINE—Pintle Post Type.**
6. **PORTABLE JAR SQUEEZE FLASK-LIFT MACHINE—with adjustable lifting pins.**

The several types shown here are representative of the complete line of Tabor Foundry Molding Machines. Tabor can supply the right type of machine for any molding need . . . to gray iron, steel and non-ferrous foundries of any size. We have been designing, building and adding to the line for over half a century. So, whatever your molding machine problems, call on Tabor.

**THE TABOR MANUFACTURING COMPANY**
**6225 Tacony Street • Philadelphia • Pennsylvania**

**Representatives:** Snyder Foundry Supply Co., *Los Angeles, Calif.;* Pacific Graphite Works, *Oakland, Calif.;* Carl F. Miller & Co., *Seattle, Wash.*

# Tomorrow's Dust Collecting Equipment



Schneible Multi-Wash Collectors are preferred by foundries everywhere because of their dependability and the fact that they efficiently remove dust and fumes, functioning over long periods—even 24 hours a day, six days a week—with no labor required for operation or maintenance, and no time out for shake-down, adjustment or repair.

Tomorrow, in an age of competition, these same characteristics will make Schneible Dust Collectors equally valuable and still your logical choice. Then, the labor savings effected by a Schneible Multi-Wash System will have a definite monetary, as well as manpower, conservation value. The freedom from operating and maintenance costs will have added importance, and clean air and better worker efficiency will be as essential as they are today.

Long time, trouble free service without maintenance is built into every Schneible unit. They are non-freezing and unaffected by heat, cold or moisture. They have no moving parts and no parts to break, burn, clog or become inoperative. They use no filters, bags or screens. Consequently, there is no maintenance cost and no interruptions of operation for adjustment or repair. Additionally, there is no dust to be handled and disposed of. The collected dust, in the form of sludge, flows to a dewatering tank (or waste). The solids are settled out and the water (or oil, used for magnesium dust) is recirculated in the collector system.

From every viewpoint, Schneible Dust Collecting Equipment is efficient and economical. Schneible Multi-Wash Dust Collectors are made in a wide range of standard sizes, with dewatering equipment and pumps for every type and size of foundry.

Write for new Bulletin No. 143 on Schneible Multi-Wash Collectors and new Bulletin No. 842 on Schneible "Uni-Flo" Dust Hoods.

**CLAUDE B. SCHNEIBLE COMPANY**

3953 Lawrence Ave., Chicago

*Engineering Representatives in Principal Cities*

# SCHNEIBLE

# CLEAN CASTINGS
## INCREASE PRODUCTION

### TAM FOUNDRY ZIRCONITE SAND YIELDS SMOOTH CASTINGS AND REDUCES CLEANING TIME

TAM Foundry Zirconite Sand used for the entire mold or as a facing sand resists the burning in of the metal and makes possible the production of clean castings and the expansion of output by reducing time in the cleaning department.

TAM Foundry Zirconite Sand does not warp, requires minimum venting and the faster chilling permits better metal distribution into heavy sections and reduces "hot tears"! Four important factors.

TAM Foundry Zirconite Sand is available in three grades, Zirconite Sand A has an approximate melting point of 3812° F. Zirconite Sands B and C 3650° F.

Full particulars on the proper applications of Foundry Zirconite Sands will be sent immediately upon request. Write:

**TITANIUM**
**ALLOY MANUFACTURING COMPANY**

TAM Foundry Zirconite Sand "A" was used in the core for the chrome steel impeller wheel illustrated. Note the clean, smooth surfaces.

**GENERAL OFFICES AND WORKS: NIAGARA FALLS, N. Y., U. S. A.**
**EXECUTIVE OFFICES: 111 BROADWAY, NEW YORK CITY**

**Representatives for the Pacific Coast . . . BALFOUR, GUTHRIE & CO., San Francisco, Los Angeles, Portland, Seattle, Tacoma**
**Representatives for Canada . RAILWAY & POWER ENG. CORP., Ltd., Toronto, Montreal, Hamilton, Winnipeg, Vancouver, Sydney**
**Representatives for Europe . . . . . T. ROWLANDS & CO., Ltd., 23-27 Broomhall St., Sheffield, England**

# CLECO *Tools*

## FOR THE FOUNDRY

OR many important jobs in the foundry, there is a Cleco Tool to help meet the demand for faster, better production. g Cleco grinders, chippers and sand rammers, your men get their work done faster, with less air and less maintenance s.

the cleaning room, there are more than a score of different and styles of Cleco Chipping Hammers—the *right* tool for y job. There is no trouble selecting a Cleco Rotary Grinder, er. To meet every requirement, these powerful, easily handled ders are available in a dozen sizes and types.

o Sand Rammers—for floor, flask, bench and core work—nicely balanced, highly efficient tools that insure uniform d density for quality castings.

o Pneumatic Tools have served the foundry industry for 40 years. Now that production is a key factor in America's ory Program, Cleco Pneumatic Tools will help you more ever before in meeting the nation's needs. The complete includes chippers, grinders, rammers, drills, riveters, hose lings and accessories.

### ASK FOR THESE BULLETINS

Cleco Rotary Grinders—Bulletin 80
Cleco Chipping Hammers-Bulletin 75A
Cleco Sand Rammers—Bulletin 76A

### BRANCH OFFICES

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**HE CLEVELAND PNEUMATIC TOOL CO.**
**81 EAST 77th STREET CLEVELAND, OHIO**
BRANCH OFFICES IN ALL PRINCIPAL CITIES

★

# WASHED DRIED AND SCREENED SILICA SAND

## Carefully Selected and Graded for Foundry Use—

FOUNDRY men throughout the country know the exceptional qualities of the uniformly screened grades of silica sand produced by the Ottawa Silica Company.

The grains being almost spherical, afford greater permeability and consequently finer sand can be used, effecting better finish.

Ottawa sands are durable! They do not break up! They are ideal for sand slinger work and are without equal for all foundry purposes where synthetic sands are employed.

FLINT
MOLDING AND CORE SAND
SILICA

A HARD, fast-cutting, thoroughly washed, dried Sandblast Sand, screened to uniform size, is produced by the Ottawa Silica Company and sold under the trade names FLINT SHOT and DIAMOND SANDBLAST SAND. It is the most economical agent that can be employed for all kinds of exacting sandblast cleaning. The round, pearl-like grains are hard as flint. They do not split up, but wear down uniformly and can be used over again many times. This abrasive flows freely, requiring less air power and gives the castings a smooth, silvery-like, velvety finish. Ask for our booklet, "Sandblasting Up To Date".

FLINT
IT PAYS TO USE
SHOT

DIAMOND
SAND BLAST

THE Ottawa Silica Company's three mills operate continuously the year round, making it possible to supply foundries with material promptly. Production includes a complete line of foundry sands suitable for molds, cores, furnace bottoms, sandblasting, for use generally in the steel, grey iron and non-ferrous fields—also Ground Silica (Silica Flour). The Ottawa Silica Company's engineering staff is always available for consultation and service on problems relative to the use of Ottawa Sands.

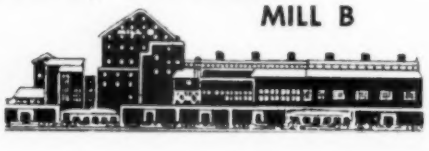
CRYSTAL
99 99/100 PURE
SILICA

## OTTAWA SILICA COMPANY

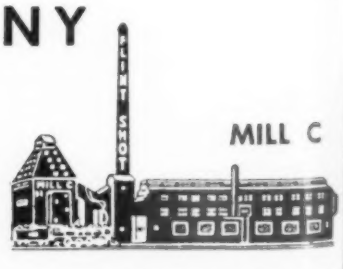
*Ottawa, Illinois*

MILL A

MILL B



MILL C



# All 'round the clock

## SCHRAMM FOR DEPENDABLE PERFORMANCE

Schramm compressors are designed for every-day, twenty-four hour continuous service and will perform such service with least up-keep and operating costs. Units are light, compact and easy to handle, reducing head-room and floor space requirements.

BUILT IN SIZES FROM 50 TO 600 CU. FT. DISPLACEMENTS

*Write for Catalog 42-S*

**SCHRAMM, INC., WEST CHESTER, PENNSYLVANIA**

## SCHRAMM *The Compressor People*

# Save LABOR, TIME, FUEL

**COLEMAN Transrack Ovens**

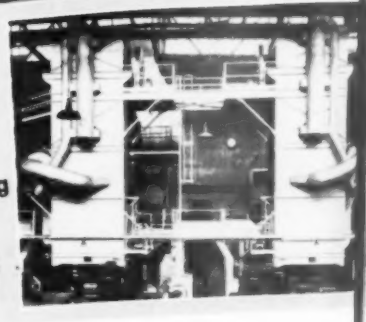
for operation with portable racks. Single or multiple rack capacity.

**COLEMAN Rolling Drawer Ovens**

for speedy baking of small and medium cores.

**COLEMAN Tower Ovens**

for high-speed production. Amazing savings in floor space and production costs.



## COLEMAN CORE AND MOLD OVENS

THE FOUNDRY

BUILDERS OF COLEMA

CLEVELAN

# ...with COLEMAN Ovens!

OVER 7,000 INSTALLATIONS

of ALL TYPES, ALL SIZES for ALL FUELS

GET QUICK RESULTS--sharp advance in quantity and quality, with less fuel and labor--install Coleman Ovens.

Coleman Core and Mold Ovens give you the benefit of over 37 years' specialization in foundry ovens and the "know-how" gained in designing and building over 7,000 successful installations.

Whether your requirements be large or small, Coleman Ovens are available in all types and various sizes to suit your particular needs.

Coleman Ovens help solve the fuel problem in that they can be furnished with modern heating systems to use whatever fuel is most easily and economically obtainable in your district.

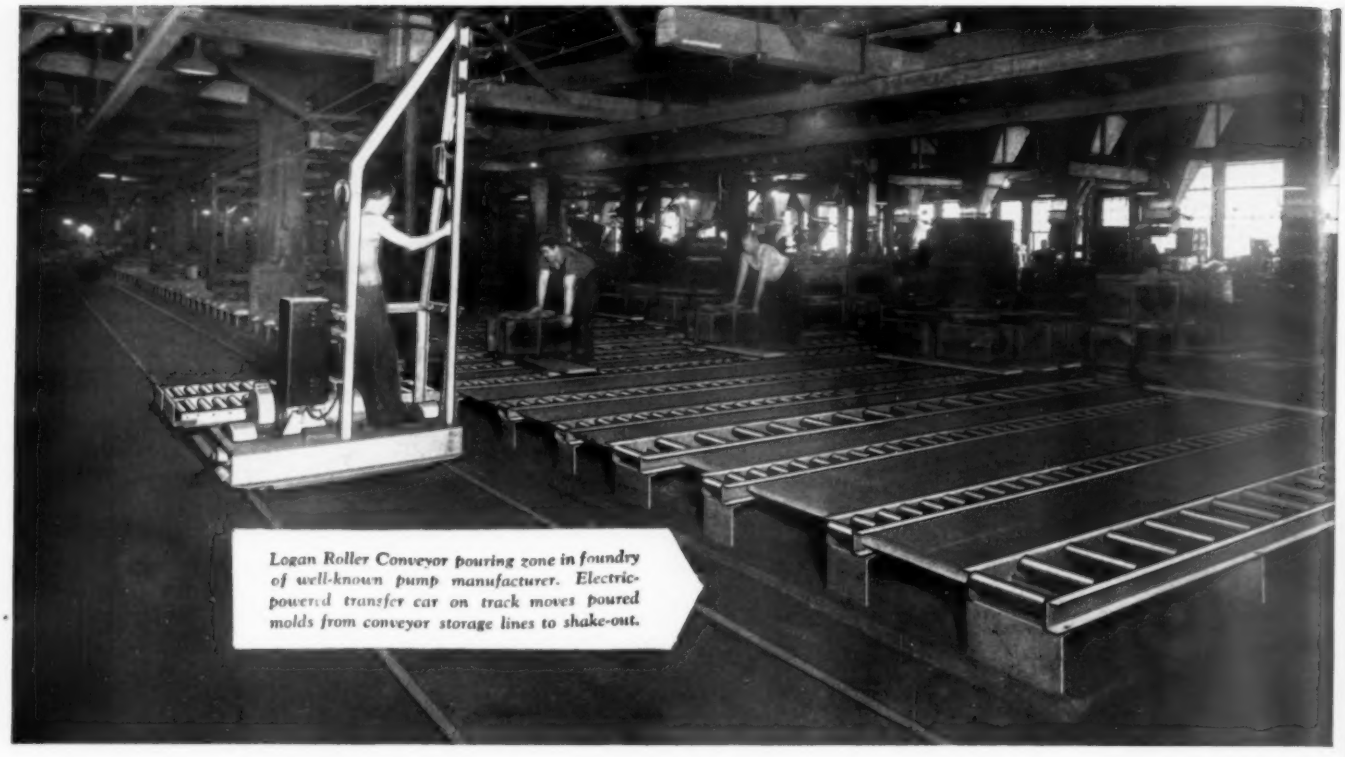
*Write for Folio of Bulletins.*

**COLEMAN Car Type Ovens** for both core baking and mold drying. No job too large.

*World's Oldest — and Largest Foundry Oven Specialists*

...QUIPMENT CO.
...D SWARTWOUT OVENS
...HIO, U.S.A.

COLEMAN CORE AND MOLD OVENS

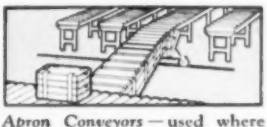


*Logan Roller Conveyor pouring zone in foundry of well-known pump manufacturer. Electric-powered transfer car on track moves poured molds from conveyor storage lines to shake-out.*

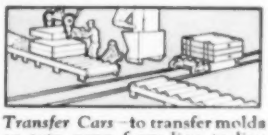
**TYPICAL USES OF LOGAN CONVEYORS IN THE FOUNDRY**

*Roller Conveyors*—basis of most foundry conveyor installations

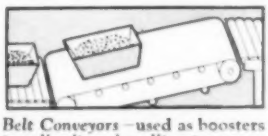
*Turn Tables*—change direction of travel in minimum of space



*Apron Conveyors*—used where power conveyors are required



*Transfer Cars*—to transfer molds or tote pans from line to line



*Belt Conveyors*—used as boosters in roller lines handling tote pans

*Roller Spirals*—for "vertical" lowering of tote pans of castings

# DON'T WASTE MANPOWER!

## Use *Logan Conveyors* to move molds, castings and tote pans

IS manpower a problem in your foundry? If so, perhaps Logan Conveyors can help you. In leading foundries Logan Conveyors—both gravity and power—are conserving man-hours by handling flasks through molding, pouring, cooling and storage; castings and tote pans to cleaning, grinding and machining operations... integrating all foundry operations into smooth flowing productive units. There is no lost motion. *No wasted man power!* Experienced with foundry conveyor systems, your nearest Logan engineer will be glad to help you work out handling problems. For valuable ideas on improving foundry efficiency, write for your copy of *CONVEYORS FOR THE FOUNDRY*. Contains interesting examples of modern foundry conveyor systems and valuable engineering data for your files. Logan Co., Incorporated, 580 Cabel Street, Louisville, Kentucky.

# Logan Conveyors

**PUT *FLOW* INTO PRODUCTION**

NE OF THE IMPORTANT TOOLS IN AMERICA'S STEEL INDUSTRY"

# Simanal

SILICON (20%)

MANGANESE (20%)

ALUMINUM (20%)

A HOMOGENEOUS FERRO-ALLOY, POSSESSING UNIQUE PROPERTIES AND ADVANTAGES IN THE MANUFACTURE OF BETTER STEELS FOR TODAY—AND TOMORROW

*A Descriptive Folder is Available on request!*

PHILO — DEPENDABILITY · QUALITY · SERVICE

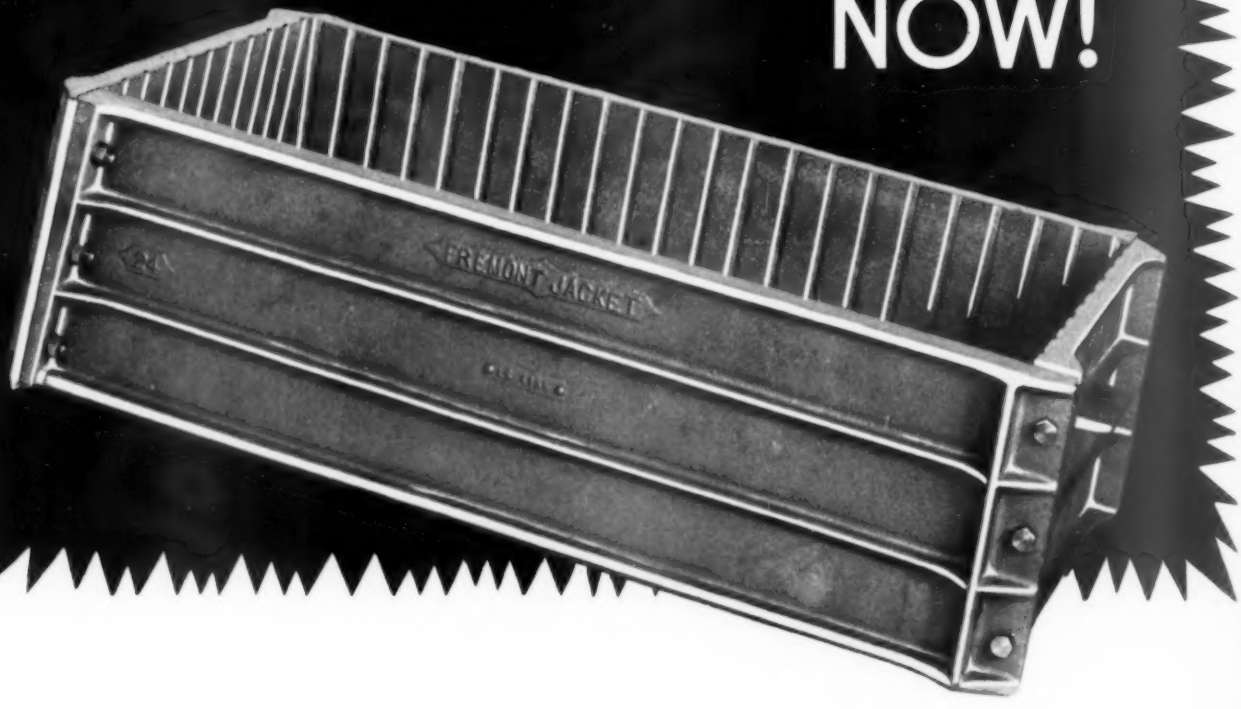
RAINIER — DEPENDABILITY · QUALITY · SERVICE

## Ohio Ferro-Alloys Corporation

Canton, Ohio

Chicago Detroit Pittsburgh Tacoma

# *A forward step that makes the flask of the* FUTURE *available* NOW!




Slip flasks and jackets underwent no great change during hundreds of years. Rough wooden boxes served without much improvement for so long that many foundrymen overlooked the possibility that slip flasks or jackets *could* be improved; they were more or less taken for granted. It is true that in time of war inventive genius is greatly stimulated. The FREMONT JACKET, for example, was especially ribbed to permit gas to escape from the mold. Moreover, all JACKET corners are machined and drilled to precision with a jig. These two improvements alone shape the future trend of foundry flasks and jackets. Standard jackets are furnished with or without ribs. "Ribbed jackets" should be specified when ordered.

**Steel foundries particularly find this a decided advantage over other jackets . . .**

**THE FREMONT FLASK COMPANY**
**FREMONT, OHIO**

*Slip Flasks* **FREMONT** **GROOVLOCK** *Jackets*

# *A lot of foundry*
# "KNOW-HOW"
## ALWAYS AT YOUR ELBOW

How to do it better—faster—cheaper—with the facilities and materials available.

How to plan production systems that increase output.

How to keep schedules moving on time.

How to find the "bugs" that sometimes disrupt operations.

Here's a man who knows how to do those things and more—because he has made iron and foundry practice his life work—and has spent his time wisely.

He is a metallurgist—knows the characteristics of irons—how they perform in cupola, ladle and flask—the qualities each produces in castings.

He is a practical foundryman who knows methods and practices—and the one which will produce best results under each combination of equipment and conditions.

He's ready to step into your foundry and make suggestions—without obligation to you. Tell us when to have him call.

**REPUBLIC STEEL CORPORATION**

**General Offices: Cleveland, Ohio**

Berger Manufacturing Division • Culvert Division
Niles Steel Products Division • Steel and Tubes Division
Union Drawn Steel Division • Truscon Steel Company
Export Department: Chrysler Building, New York, New York

*Republic*

# PIG IRON

"CHATEAUGAY"
*Low-Phosphorus, Copper-Free*
"REPUBLIC"
(Northern)
*Foundry, Basic and Malleable*
"PIONEER"
(Southern)
*Foundry and Basic*

**ALSO TRUSCON FOUNDRY FLASKS • REPUBLIC CORE WIRE • FOUNDRY NAILS**

# SWINDELL

## *electric arc melting furnaces*

Bringing to the rapid war production of steel every *performance advantage* including

**TOP CHARGING • SWINGING ROOF**
**4-POINT ROOF SUSPENSION**

INTEGRATED CONSTRUCTION OF ROOF OPERATING MECHANISM

*LET US CONSULT WITH YOU!*

**SWINDELL-DRESSLER** *Corporation*

DESIGNERS AND BUILDERS OF MODERN INDUSTRIAL FURNACES

PITTSBURGH, PA.

# "BRICKS for "BOMBSHELLS"

IN effect, advanced American machines are "bombshells" since they are producing vast quantities of ordnance which is blasting the enemy. And into these vital machines are going excellent castings, many of which are greatly improved in quality by Famous CORNELL iron FLUX.

This is particularly true of castings that must have great machinability and be capable of withstanding pressure tests.

Famous CORNELL FLUX gives remarkable, uniformly good results, even with the large percentage of inferior scrap that must be used today.

It purges and purifies, producing cleaner, denser castings free from spongy spots.

It glaze coats the cupola and saves brick.

It is economical as compared with fluorspar or limestone.

Its brick form makes it convenient and economical to use. Simply toss in a brick for each ton of metal—a briquette for each 500 pounds. Unlike powder it will not blow out with the blast but remains until completely consumed.

If you are not now getting the benefit of this widely used, long approved flux, write for literature today.

## *Famous* CORNELL *Aluminum* FLUX

permits the use of more scrap and produces sound castings, free from spongy or porous spots. An exclusive feature is its absence from obnoxious fumes.

## *Famous* CORNELL *Brass* FLUX

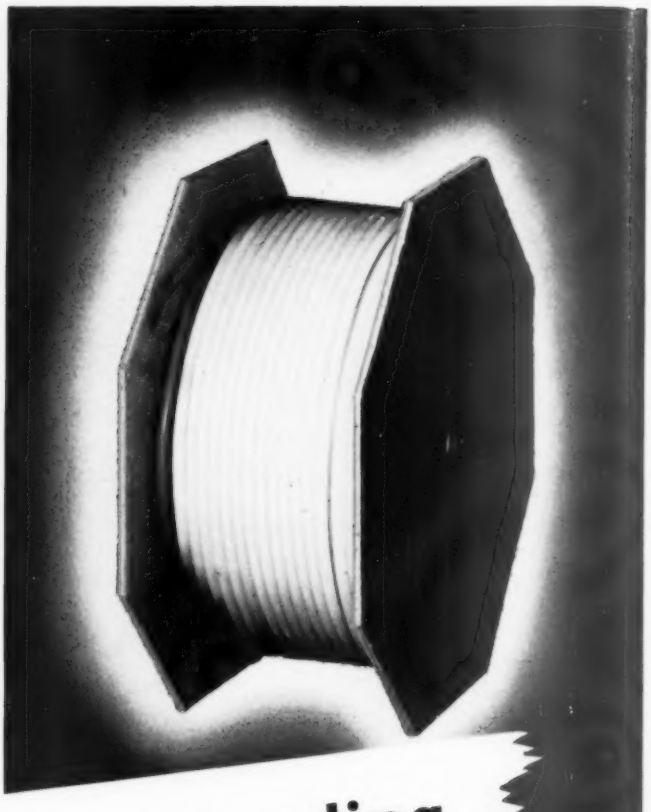
produces dense castings that withstand high pressure tests and polish beautifully. It purges and purifies—permits the use of dirty borings and sweepings—saves fuel and saves tin and other critical materials.

## *The* CLEVELAND FLUX *Co.*

**1026-34 Main St., N.W., Cleveland, Ohio**

*Manufacturers of Iron, Brass and Aluminum Flux Since 1917*

MASTER
DISC CEMENT
"Easy to Apply and Easy to Remove"
A new, revolutionary, time and labor saving compound for applying abrasive discs. Quick, accurate and economical.
Guaranteed to produce absolutely satisfactory results when used according to directions.
Distributed exclusively by
THE KINDT-COLLINS CO.
Cleveland, Ohio
"Everything for the Pattern Shop"



# 2 Efficient Work-Speeding MASTER Products to Increase Pattern Shop and Foundry Production

## ★ MASTER DISC CEMENT ★

Eliminates needless time lost in changing of abrasive discs, thereby cutting down unproductive time. It is an easy-to-use, *fast-sticking* cement that encourages the application of new, efficient-cutting discs whenever they are needed to replace worn, slow-cutting discs. It is easy to apply and easy to remove.

MASTER Disc Cement will work perfectly on flexible or cloth-backed abrasives. It is not designed for heavy fibre-backed discs. When used as recommended, it is guaranteed to produce absolutely satisfactory results, and will remain as accurate and level as the face of the metal disc to which it is applied.

Improve your grinding operations with this speedy, modern adhesive. MASTER Disc Cement is put up in one quart containers only. Order a trial lot today, and watch the results.

## SPECIAL CORE VENT WAX

### *For Magnesium Work*

This is a new, scientifically-formulated wax to solve the critical problems of magnesium core work

It eliminates blows, reduces scrap, and will prove a big help in stepping up your profitable output. It is free-flowing, and guaranteed not to affect the permeability of the core. Can be furnished hollow or solid, in various shapes and sizes. *Only one grade is necessary for summer and winter use!*

Right now, when you are faced with the job of getting out more and more production, you should be using MASTER Special Core Vent Wax for all your magnesium work. Send in a trial order and write us about any core-vent problems you may have, specifying type of core binder, sand, and metal used.

***Kindt-Collins has a complete range of fine products for pattern shop and foundry use, to reduce costs and increase the quality and quantity of your finished work. Write us of your needs.***

# THE KINDT-COLLINS COMPANY

***"EVERYTHING FOR THE PATTERN SHOP"***

12653 ELMWOOD AVENUE ★ CLEVELAND, OHIO

# Increase Production

*with Your Portable Grinders, too*

MANY foundries specify Norton grinding wheels for their floor stands and swing frame grinders on the basis of carefully kept performance records. Similar records are more difficult to keep on portable grinders but you can be sure that Norton wheels will give you the same outstanding performance—the same high production.

And today, when every ounce of production is vital, it is absolutely essential to use the best possible wheels—wheels research-developed especially for portable grinders—wheels that are tough and rugged to stand up under use by inexperienced workers.

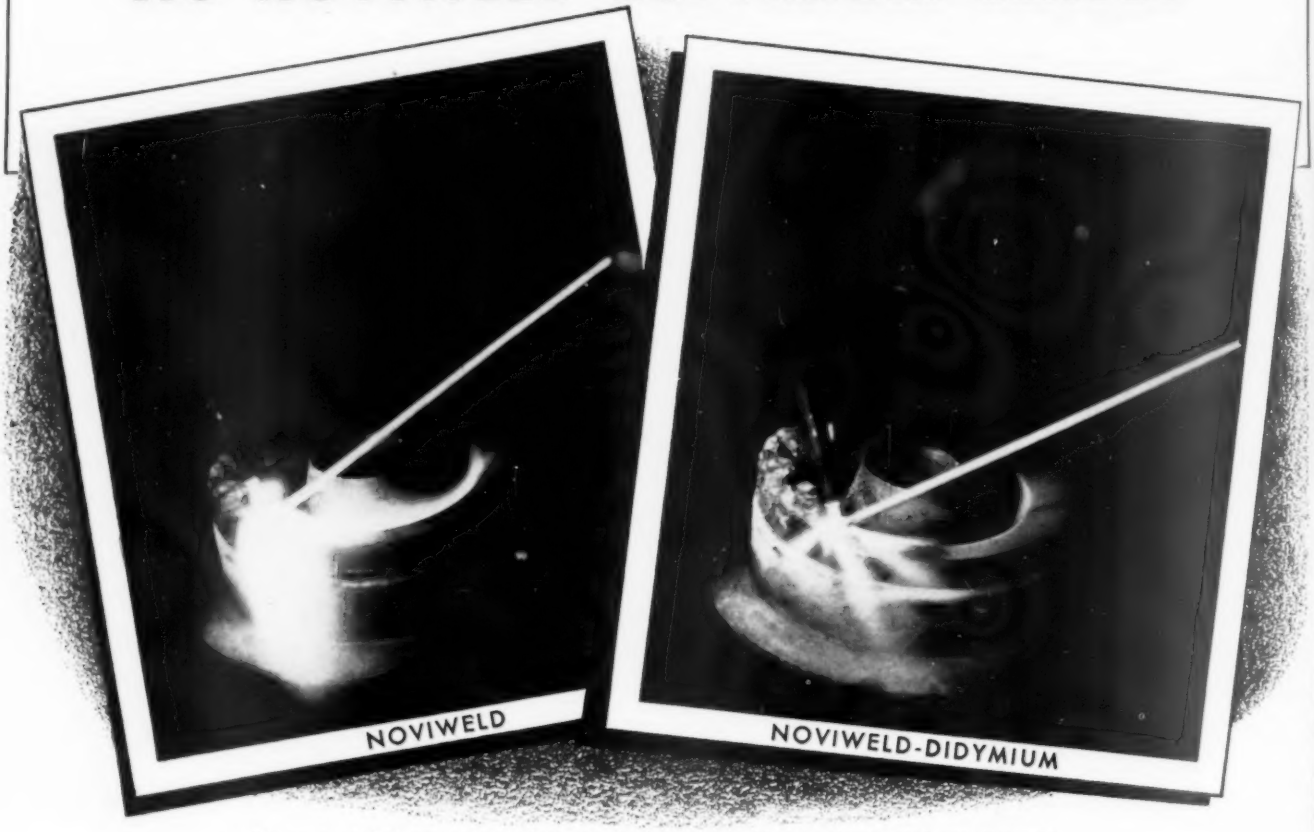
Let Norton abrasive engineers study your portable jobs, too. Let them specify straight, cup and cone wheels in the grains, grades and structures to give you maximum production on your war jobs.

**NORTON COMPANY**
Worcester, Mass.
*Distributors in All Principal Cities*

W-911

**NORTON ABRASIVES**

# These unretouched Pictures show you why welders do better work with AO NOVIWELD-DIDYMIUM LENSES




*The unretouched photograph, at right, instantly shows that welding goggles equipped with Noviweld-Didymium Lenses enables a flame-welder to look right through the cloudy yellow flame of burning sodium vapors and see the rod and molten area more clearly. This clearer vision greatly increases his efficiency, allows him to do more and better work, gives him greater protection and comfort.*

## ... and NOVIWELD-DIDYMIUM LENSES offer you all these other advantages, too...

Noviweld-Didymium Lenses are considered by many who have tested them, to be the greatest welding glass *ever* developed! *That's* how important they are to your company . . . and to war production.

REMEMBER: AO Noviweld-Didymium absorbs Sodium flare and *also* protects welders' eyes against BOTH ultra-violet and infra-red radiation, meeting the Bureau of Standards Safety Code Specifications in both of the latter respects.

And, in addition, Noviweld-Didymium has the following *other* advantages: it preserves orange and red color values, enabling the operator to see red-hot bead and molten area in brilliant color, it is ground and polished to ophthalmic standards of quality, *and* present stocks indicate *immediate delivery* in shade numbers 4, 5 and 6 for welding goggles.

Behind Noviweld-Didymium are American Optical Scientists and the achievements of the AO Laboratory . . . the same laboratory that has contributed so many other outstanding developments to welding eye protection and *better* welding.

Don't wait . . . get in touch with your nearest AO Branch Office today for a convincing demonstration of how Noviweld-Didymium allows both skilled and inexperienced flame-welders to do better work.

American Optical
COMPANY
SOUTHBRIDGE, MASSACHUSETTS

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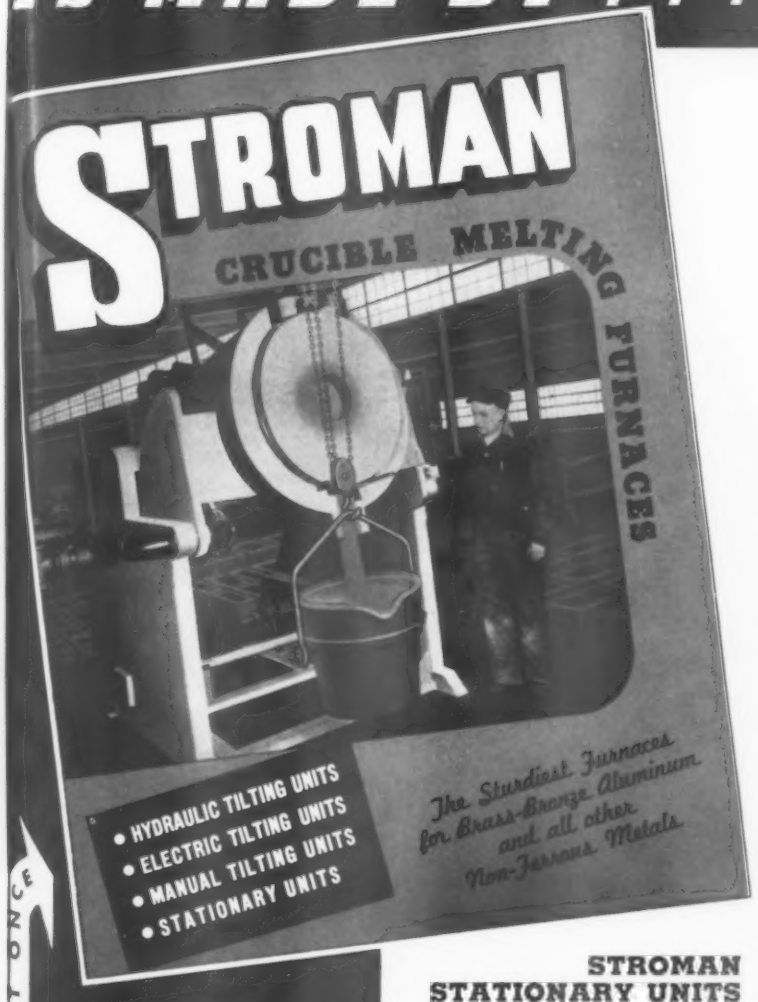
# THE CORRECT FURNACE FOR YOUR NEEDS
## IS MADE BY . . . STROMAN


STROMAN
CRUCIBLE MELTING FURNACES
• HYDRAULIC TILTING UNITS
• ELECTRIC TILTING UNITS
• MANUAL TILTING UNITS
• STATIONARY UNITS
The Sturdiest Furnaces for Brass-Bronze Aluminum and all other Non-Ferrous Metals

Stroman Furnaces are designed and engineered to assure utmost efficiency in the melting of Brass, Bronze, Aluminum, Magnesium and all other types of non-ferrous metals. Embodying many time, labor and metal saving features, including the famous Stroman Hydraulic Tilting Nose Pour Furnace, which allows the ladle to remain in the same position during the entire pour . . . They are without a doubt the most economical to operate, compact, rugged and lasting furnaces available. From the largest automatic Tilting Unit to the smallest Stationary Unit you cannot secure a better furnace than a Stroman. Learn all about them, send for new folder No. 143 just off the press.

**STROMAN MANUAL TILTING FURNACE**

**For Brass, Bronze and Aluminum: Capacities from numbers 40 to 400 crucibles.**

Built to conform with "heavy duty" production, these popular furnaces have proved their ability to "take it" in many of the leading foundries here on the home front. Compact in design without sacrificing strength or rigidity, this hand wheel tilting unit with improved swing type cover will do its job well in your plant. Fired by gas or oil.

SEND FOR NEW FOLDER NO. 143 AT ONCE

Cover closed

Cover open

**STROMAN STATIONARY UNITS**

**For Brass, Bronze, Aluminum and other non-ferrous metals. Capacities from numbers 20 to 400 crucibles.**

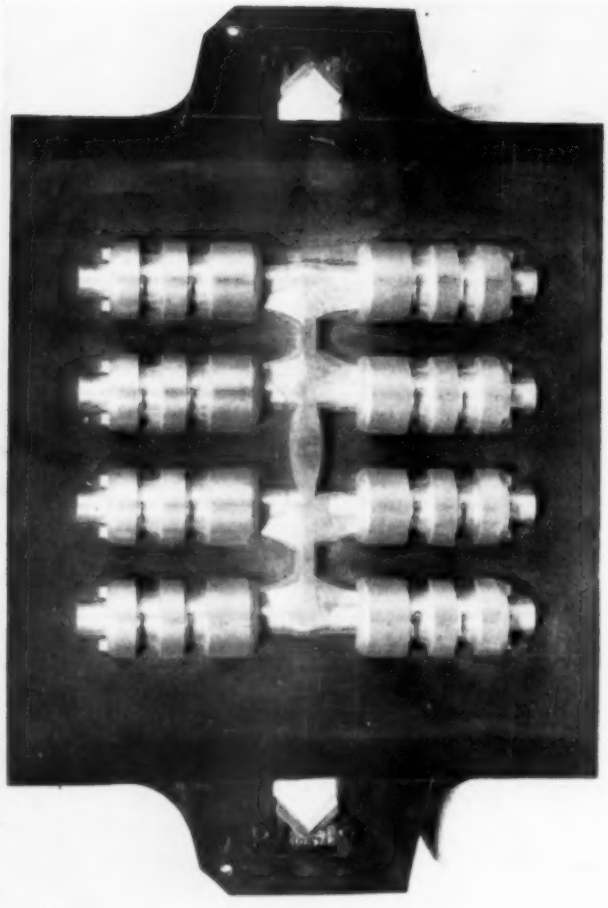
These sturdy Stroman "Push Back Cover" stationary furnaces are indeed the last word in efficiency and economy. In order to open cover, operator simply inserts a long, steel bar and pushes the cover back. To close, he just reverses the action. Eliminates burns, saves time and nothing to go out of order. Stroman high quality of construction assures indefinite lasting of every Unit . . . and special burners for gas or oil fire keep fuel costs at a minimum.

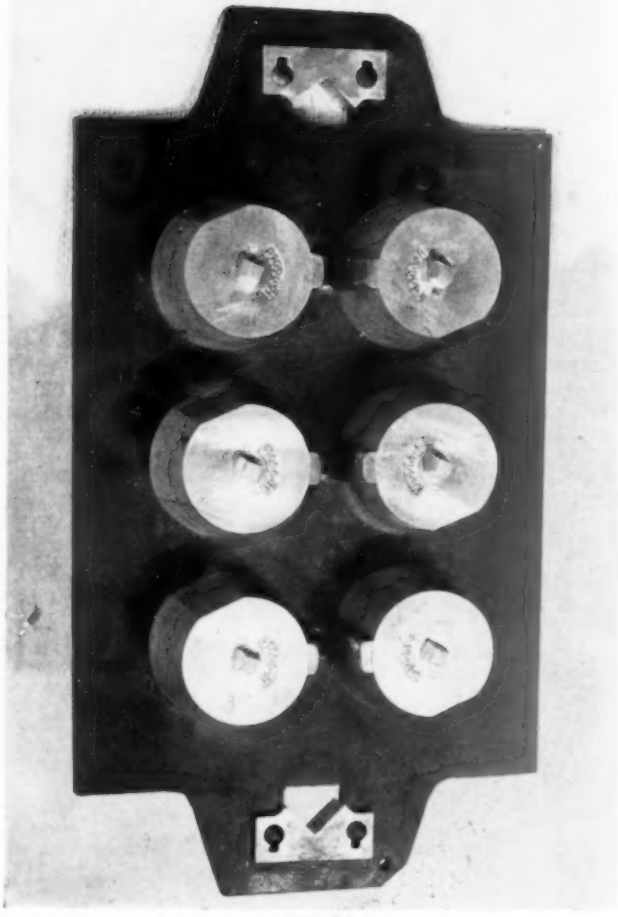
**STROMAN FURNACE & ENGINEERING CO.**

DIVISION OF

THE PETERSEN OVEN CO. 300 W. ADAMS ST. CHICAGO

# LIGNOLITE





NON CRITICAL **PATTERN PLATES** IMMEDIATE SHIPMENT

- FLAT
- UNIFORM CALIPER
- LIGHT WEIGHT
- HIGH STRENGTH
- EASILY MACHINED
- MOISTURE RESISTANT

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**STANDARD SIZES—HOW TO ORDER**

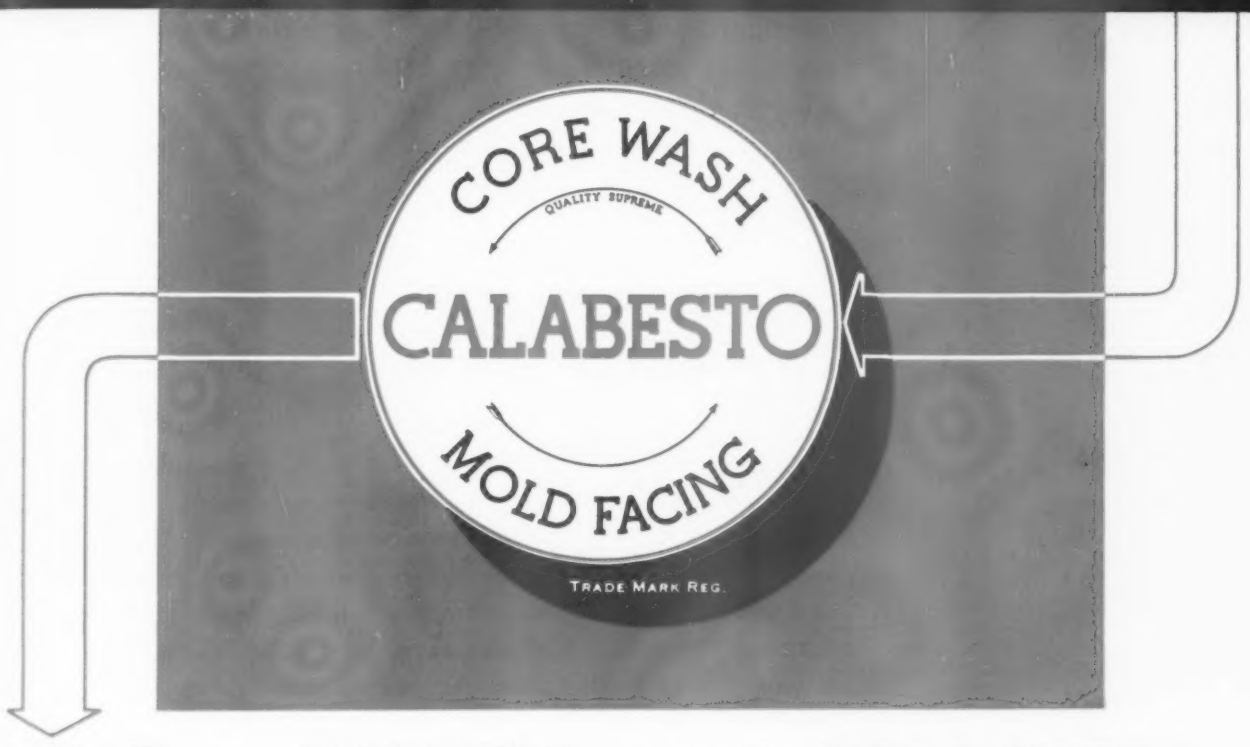
Available in all flask sizes, 3/8" to 2" thick. Standard plates are octagonal in shape with 1" allowance for flask and 2½" allowance for ears. Sheets are also available for own cutting. Sizes are 46" x 46" for thicknesses from 3/8" to 5/8" inclusive; 40" x 40" for thicknesses over 5/8". Please write for sample and complete information.

## MARATHON CHEMICAL COMPANY

DIVISION OF MARATHON PAPER MILLS COMPANY

**ROTHSCHILD** **WISCONSIN**

# *Announcing Something New*




## ● For BRASS and BRONZE

We say CALABESTO is new—but its ingredients are old and well tested. This superior core wash and mold facing is prepared from a combination of heat resisting minerals of high refractory value. They were selected by experimental elimination, and the result, CALABESTO, is now offered to the non-ferrous foundry industry as a core wash and mold facing expressly manufactured for brass and bronze work.

CALABESTO is a departure from Plumbago washes and facings. It is remarkably clean, and does not draw dampness. Packed only in dry, powdered form, CALABESTO is made ready for use merely by mixing plain water with the dry powder. Then it can be applied by brush, swab or spray gun.

We urge non-ferrous foundrymen to get acquainted with CALABESTO, and to try it out on cores, sand molds and furnace linings.

Agents and jobbers who are interested, may write to us about CALABESTO, the new core wash and facing that came out of the West.

## PACIFIC GRAPHITE WORKS

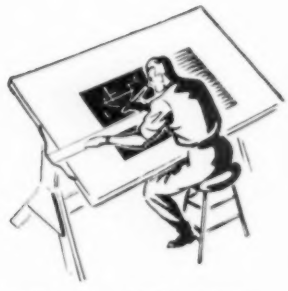
**40th and LINDEN STREETS • OAKLAND, CALIFORNIA**

# Spotlighting THE COMPLETE LINE OF

Schedules are tough today! So why take chances with inferior molding machines? Play safe! Specify the dependable MILWAUKEE Molders. They are built BY foundrymen FOR foundrymen, and are backed by more than 22 years' specialized experience in this field.

In the complete MILWAUKEE line, you'll find a model to meet every molding requirement. Every machine is engineered to keep pace with today's urgent demand for speed, speed and more speed . . . yet maintaining high standards of quality.

Designed with the fewest number of working parts, MILWAUKEE Molders are built to take hard everyday punishment. Steel castings and alloy steels are used wherever stress is applied. Close-grained, high-tensile grey iron is used wherever wear occurs. Instead of links and levers, rigid integral members are employed for alignment. Hardened pins and bushings serve as guides. Correct lubrication is provided. All parts are accurately machined to close tolerances. Adjustments are very accessible and easy to make.

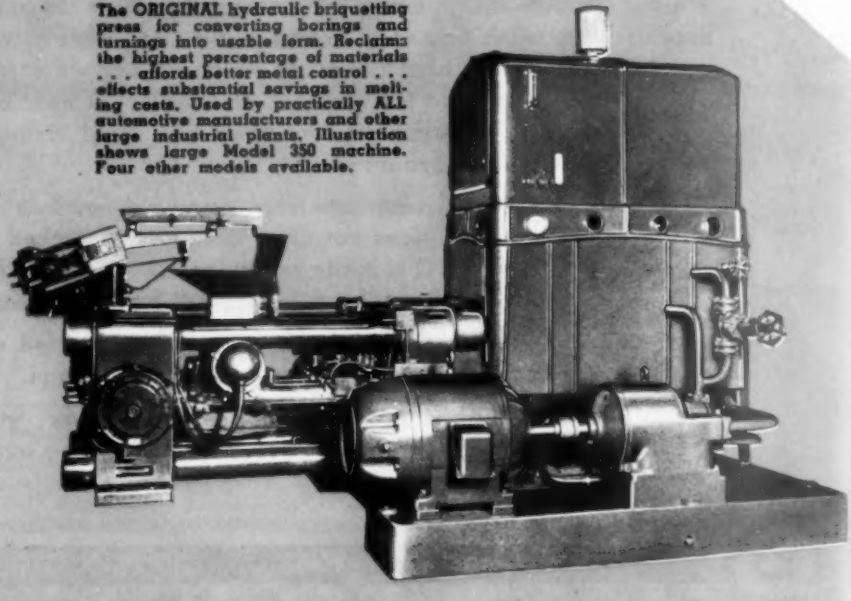


**Call in a Milwaukee Foundry Equipment Engineer**

Our engineering and sales department personnel is composed of practical, seasoned foundrymen, familiar with all phases of the industry. This broad experience enables our men to study your molding and core making problems intelligently, and arrive at a solution that is both practical and economical.

**Milwaukee Hydraulic BRIQUETTING PRESS**

The ORIGINAL hydraulic briquetting press for converting borings and turnings into usable form. Reclaims the highest percentage of materials . . . affords better metal control . . . effects substantial savings in melting costs. Used by practically ALL automotive manufacturers and other large industrial plants. Illustration shows large Model 350 machine. Four other models available.

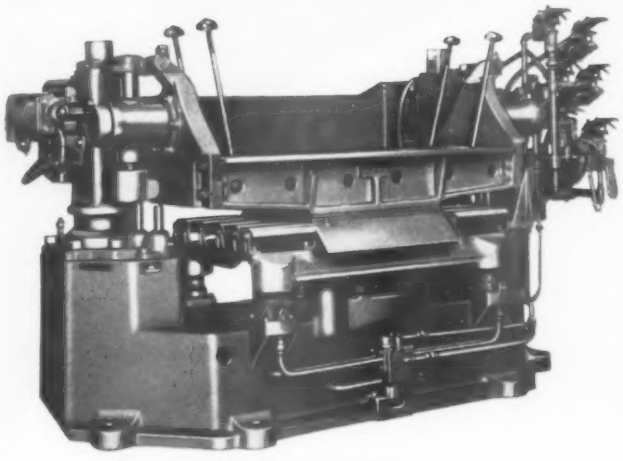


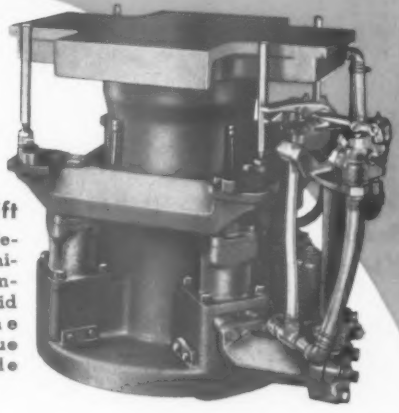
# MILWAUKEE

MANUFACTURERS OF MOLDING MACHINES AND BRIQUETTING PRESSES

# MILWAUKEE MOLDERS

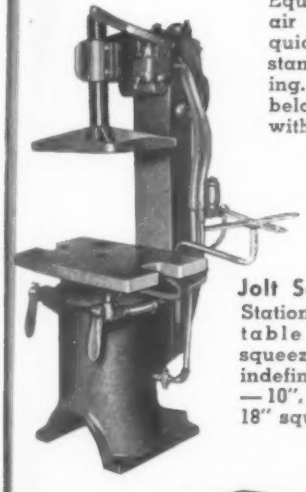
*Designed • Built • Sold and Serviced* BY EXPERIENCED FOUNDRYMEN



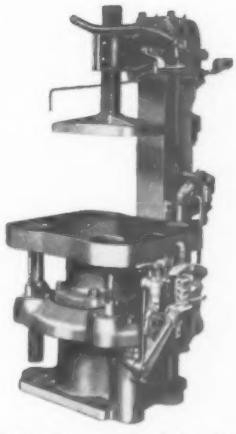


**Jolt Pin Lift**
Simple in design to eliminate maintenance. Rigid draw frame insures true draw. Made in 6 sizes.

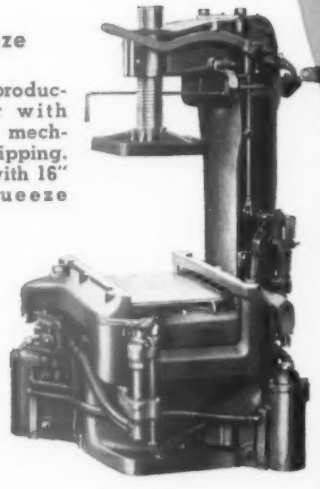
**Jolt Rollover Draw**
Equipped with automatic air clamps, power rollover, quick-acting pistons and instantaneous hydraulic leveling. Draw pistons above or below floor line. Available with or without jolt. 6 sizes.



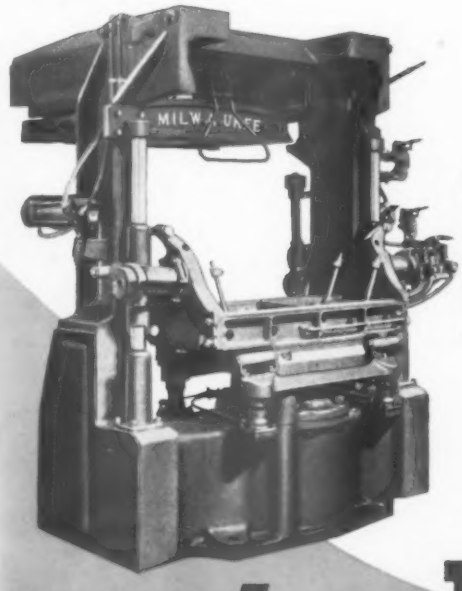
**Jolt Squeezers**
Stationary or portable — Parallel squeeze maintained indefinitely. 4 sizes — 10", 12", 13" or 18" squeeze pistons.



**Jolt Squeeze Stripper**
Arm type, production molder with air-dogging mechanism for stripping. Available with 16" or 19" squeeze pistons.



**Jolt Squeeze Pin Stripper**
The triple duty molder. Use it as a jolt squeezer, as a jolt squeeze pin stripper or pin lift machine. 5 sizes available — 12", 14", 16", 19" and 21" squeeze pistons.




**Jolt Squeeze Rollover Draw**
Power rollover with automatic leveling and smooth pattern draw. 3 sizes available—16", 19" and 21" squeeze cylinder diameters.

**Jolt Squeeze Stripper**
Car suspended squeeze platen permits fully automatic overhead mold removal. 21" or 24" squeezing pistons.

## Foundry Equipment Co.

238 WEST PIERCE STREET • MILWAUKEE, WISCONSIN, U.S.A.

**LOGISTICS** is the word for the exact military science of supply and delivery. Upon the speed and facility with which this branch of the service can function depends the eventual outcome of the war. On the factory front, too, adequate supply and delivery of raw materials are just as vital.

And that is where Federated Metals steps in. With its geographically strategic plants and distributional centers adjacent to or an integral part of every important manufacturing center, Federated is equipped and keyed to fill wartime's demands for non-ferrous metals of dependable quality.

Today, Federated's traditional skill, research and manufacturing facilities are devoted – 24 hours around the clock – to the production of more and more perfect ingots for the needs of industry. Tomorrow, these better metals will be available to help you meet the post-war battle of competition. *For information, contact your nearest Federated Sales Office.*

# Logistics

*is another word for*

# SERVICE!

PRODUCTS PRODUCED BY FEDERATED METALS

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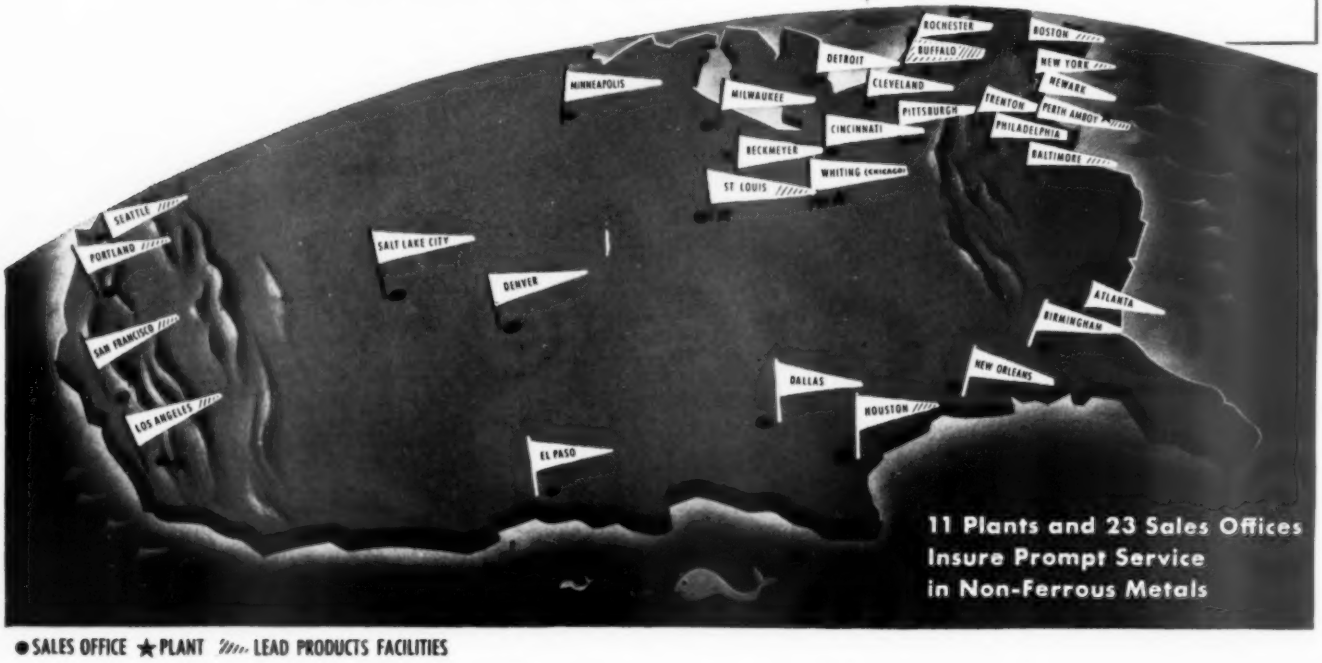
|---|---|
| ALUMINUM | SOLDER |
| BRASS | BABBITT |
| BRONZE | TYPE METAL |
| ZINC | LEAD |

All of these in all commercial forms – Special Alloys to your specifications.




●SALES OFFICE ★PLANT ▨ LEAD PRODUCTS FACILITIES

## FEDERATED METALS DIVISION

## AMERICAN SMELTING AND REFINING COMPANY

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FMD
FEDERATED METALS DIVISION
AMERICAN SMELTING AND REFINING COMPANY

# To the FOUNDRYMEN of tomorrow

## RETAINED STRENGTH

*The strength developed by a sand mixture after it has been heated to a temperature above 230° F. and then cooled to room temperature.*

Many binders will produce strong cores and molds, but may not produce good castings.

Use the combination of bonds which perform well from room temperature to metal temperature.

Strength and stability are the result of using well balanced bonds.

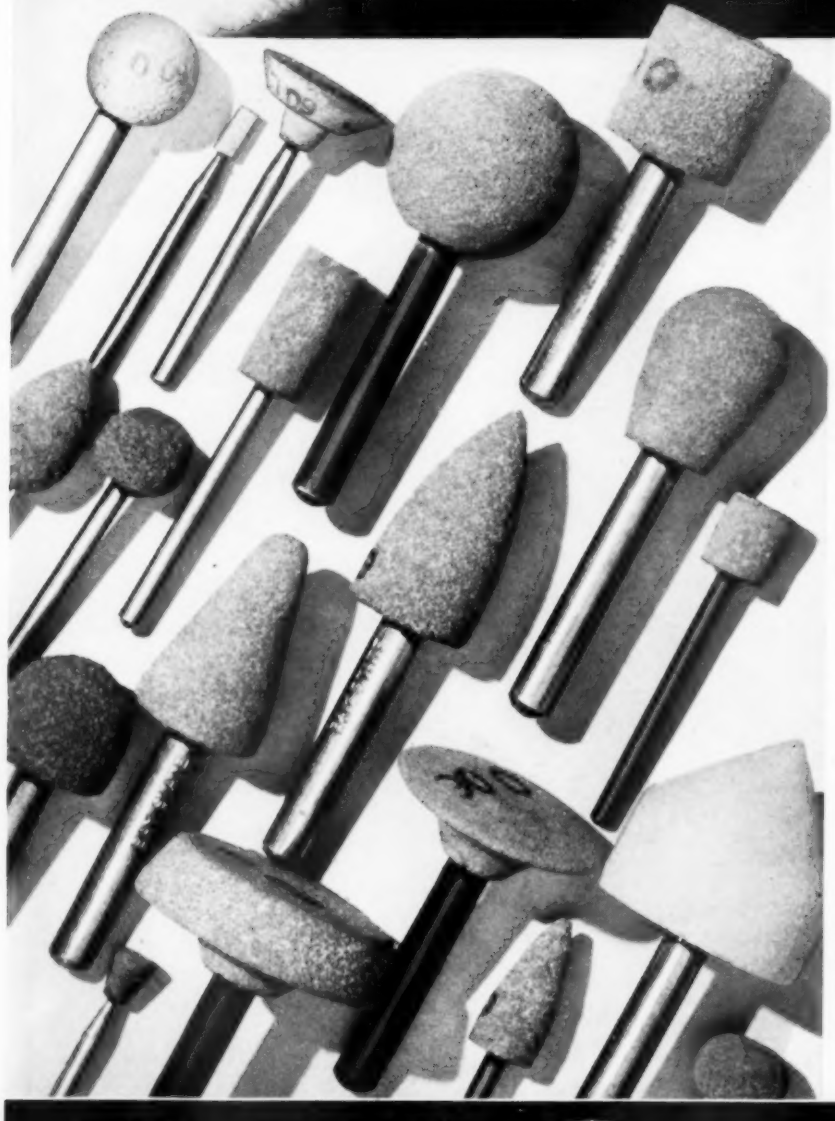
Produce smooth castings and eliminate defects with good sand mixtures.

There's a McCormick Bond for every job.

**J. S. McCORMICK COMPANY**
25TH STREET AND A. V. R. R.
PITTSBURGH, PA.

LION BINDER—KLIMAX KORE KOMPOUND—IMPERIAL BINDER

# A little touch MEANS SO MUCH!



*There are several honest-to-goodness reasons why BAY STATE wheels and points are preferred for those innumerable, fussy jobs on moulds and dies.*

**1.** They are pressed into uniform blanks, assuring grade hardness.

**2.** They are formed absolutely true on BAY STATE precision lathes.

**3.** They are ready for immediate cutting action — in a myriad of shapes and sizes.

**4.** They can be used completely down to the spindle.

**5.** They will not come off the spindles.

**6.** They are free from "hard and soft" spots.

*Send for illustrated catalog and bulletin containing standard stock and mandrel specifications.*

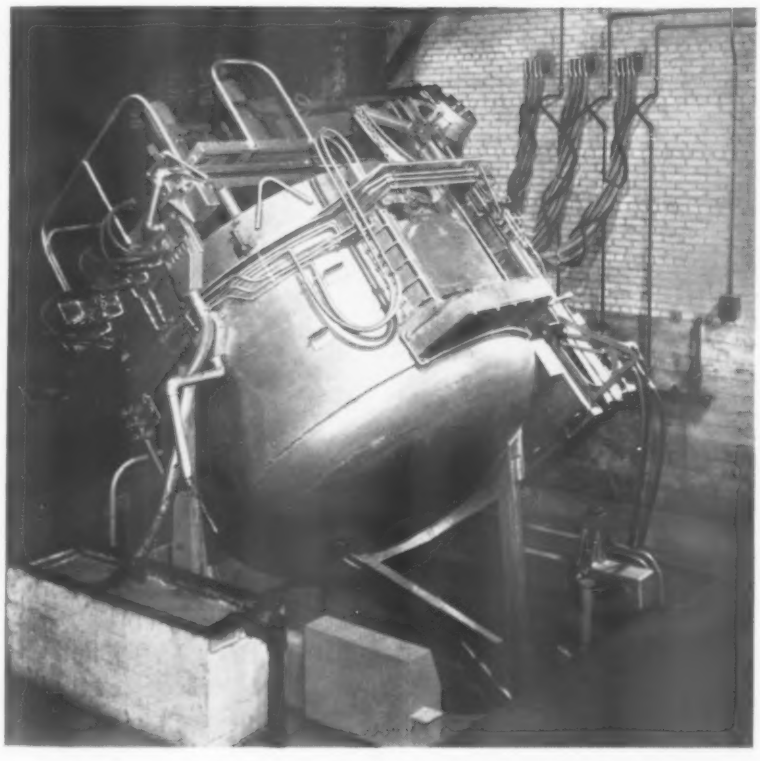
BAY STATE WHEELS of PROGRESS

# BAY STATE

ABRASIVE PRODUCTS CO., WESTBORO, MASS. U.S.A.

# *Steel Melters!*
# WRITE FOR THIS BOOK...

. . . "Important Developments in Electric Melting Furnaces." It discusses several far reaching improvements and simplifications . . . explains how metal making may be done more accurately at the lowest costs. Written by men who have been associated with steel making throughout their entire business lives. A copy will be sent free when requested on a company letter head.



*Hydro-Arc engineers will cheerfully study your Electric Melting Furnace Problems and make complimentary suggestions.*

## *Two Outstanding Features*

Two outstanding features of Hydro-Arc Electric Melting Furnaces are: (1) Hydraulically positioned electrodes and (2) Power operated electrode clamps.

The Hydro-Arc Furnace uses low inertia air for counter-balancing to cooperate with a simple, accurate, hydraulic control to operate each electrode. Low upkeep—less surging—less electrode wash and more accurate metal making at lowest costs are being accomplished.

## *Here's What Melters Say:*

1. "No climbing on the furnace among the flames to strain on burnt bolts and no swinging the sledge hammer to clamp electrodes!"

2. "Electrodes slipped from the floor!" 3. "Look at the hydraulic control!" 4. "Fastest electrodes I ever saw, but good control!" 5. "Simple isn't it? Can change any part in a few minutes!"

# HYDRO-ARC
## FURNACE CORPORATION

**561 HILLGROVE AVENUE, LA GRANGE, ILLINOIS** (A Suburb of Chicago, Illinois, U. S. A.)
TELEPHONES: LA GRANGE 4545 AND 4546 CHICAGO LINE: ENTERPRISE 1068

Associated with Whiting Corporation

# 19 MAEHLER OVENS...

## at the world's largest

## *Non-Ferrous Jobbing Foundries!*

*Right — 8 of 12 ovens at Howard. Two racks in each compartment — 24 racks in all. One gas fired Maehler air heater for each double oven. L & N and Wheelco controls and automatic dampers (a new Maehler development) for each heater.*

*Below — All ovens equipped with lift doors and Maehler type safety latches.*

### *100% Maehler Core Ovens* at Three Howard Foundries

Maehler re-circulating air heat core ovens are standard in Howard's three plants—the magnesium and aluminum foundries in Chicago and the bronze foundry at Aurora, Illinois.

•

**Approximately 90% of Maehler's production is devoted to filling *repeat orders* for core ovens and heat treating furnaces—mute testimony to customer satisfaction. If you need ovens or furnaces, here is your best guide to a source of supply.**

TWO aging ovens, one cabinet type core oven and twelve rack type core ovens—that's the Maehler installation at the Howard magnesium foundry in Chicago, making a total of 19 Maehler Ovens at all Howard plants. At full capacity this plant will be the largest magnesium sand casting foundry in the United States—and probably largest in the entire world! It's another American wartime industrial triumph, in which Maehler is proud to have played an important role.

In leading foundries throughout the country, you'll find Maehler ovens producing better, more evenly baked cores—faster—at less cost.

# • MAEHLER •

**The PAUL MAEHLER CO.**

2200 W. Lake St. • Chicago

*Industrial Ovens and Furnaces*

# MELTRITE PIG IRON

## Makes

## GOOD CASTINGS

★

★

★

**PICKANDS MATHER & COMPANY**

CLEVELAND • CHICAGO • DETROIT • ST. LOUIS • ERIE • DULUTH • MINNEAPOLIS • TOLEDO

New York—William R. Alley • Philadelphia—Carson, Marshall & Company

San Francisco, Los Angeles and Seattle—H. L. E. Meyer Jr. & Company

IRON ORE ★ PIG IRON ★ COAL ★ COKE

## QUICK QUIZ PROGRAM
FOR AJAX WYATT FURNACE OPERATORS

*QUESTION:* How can you employ max. current input without adversely affecting the power factor?

*ANSWER:* By installing a lining that resists erosion at high temp., specifically—

# CUPOLA PATCH

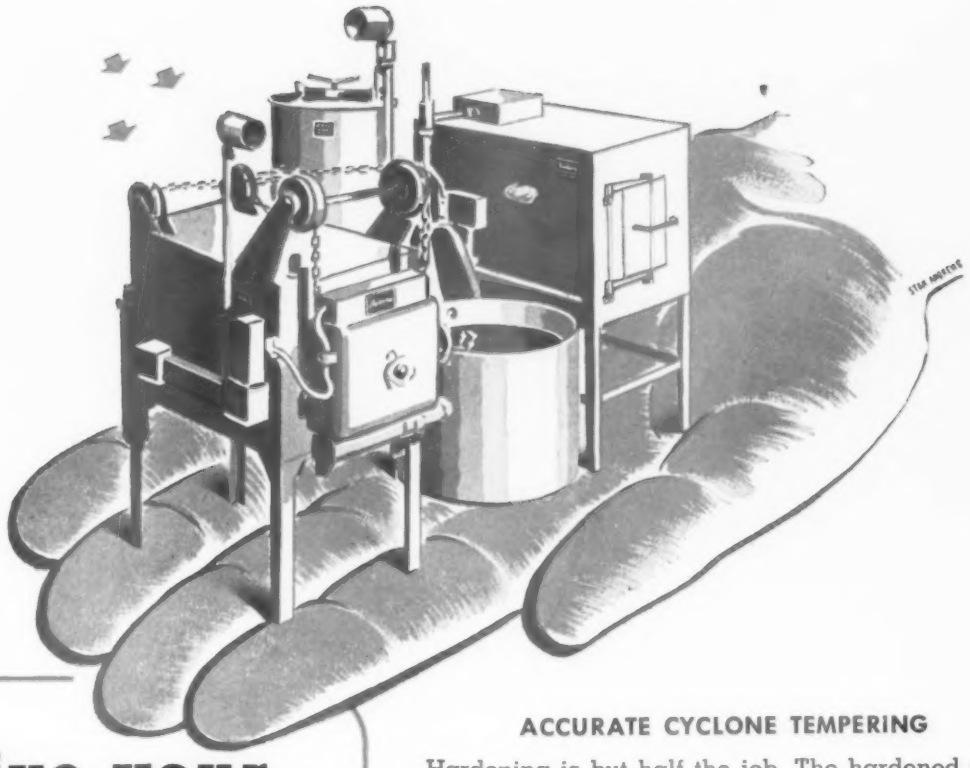
- ★ With durable Cupola Patch, you can force your furnace without losing the efficient slot dimensions.
- ★ Hence, you can melt more metal per hour.
- ★ The dense, impermeable structure of this refractory retards penetration of metallic vapors, oxides and slags.
- ★ Used as a general-purpose lining, because it's metallurgically neutral.
- ★ Particularly successful in melting pure copper, cupro nickel and rich alloys, as well as common yellow and red brasses.
- ★ *The supply of Cupola Patch is not threatened by any shortage of materials.*

Cupola Patch lined Ajax Wyatt Furnace operating in a large copper and brass rolling mill.

**ELECTRO REFRACTORIES AND ALLOYS CORP.**

GENERAL OFFICES: ANDREWS BUILDING, BUFFALO, N. Y.

*Manufacturers of Crucibles, Alloys, Stoppers, Refractories, Grinding Wheels*



# Give your toolroom a HAND

Give a plus value to each of your tools and dies. Value in longer life. Value in time and money saved. Give your toolroom a boost with hardening and tempering furnaces that will heat treat each tool and die with the same precision that went into their making.

### PRECISION HARDENING OF ALL TOOL STEELS

Tools and dies of even the "touchiest" tool steels, including highspeed, can be finished to size before heat treating when hardened in a Lindberg Hydryzing Furnace, because Hydryzing controlled atmosphere eliminates scale, decarb and carburization. This means that the parts have full, uniform hardness "as quenched" and the clean, hard surface saves the expense of costly grinding or polishing after heat treating.

### ACCURATE CYCLONE TEMPERING

Hardening is but half the job. The hardened part should be tempered with equal accuracy to obtain its specified hardness. Key men in practically every toolroom in the country recognize the Cyclone Tempering Furnace for its rapid uniform heating. In fact, its heating and control accuracy is such that temper can be controlled to ±1 Rockwell "C." And, too, you'll be amazed at its economy and efficiency of operation.

### COMPLETE TOOLROOM SETUP

Lindberg can supply the finest available toolroom setup to meet any heat treating requirement, complete with quenching system. Write for Bulletin 94. It tells all the advantages of hardening with Hydryzing. And also ask for Bulletin 13. It shows why the Cyclone is the ideal tempering furnace for tools and dies.

**LINDBERG ENGINEERING COMPANY**
**2453 WEST HUBBARD STREET • CHICAGO**

**LINDBERG FURNACES**

ARMY E NAVY

**SUPER-CYCLONE for hardening, normalizing, annealing, tempering**
**CYCLONE for accurate, low-cost tempering and nitriding**
**HYDRYZING for scale-free and decarb-free hardening**

Official OWI Photo

# The Crucible Furnace...

## MOST CAPABLE NONFERROUS MELTING UNIT

Capable of rapidly producing clean metal with minimum skill or training of attendants.

Capable of melting a variety of alloys by simply changing the metal charged.

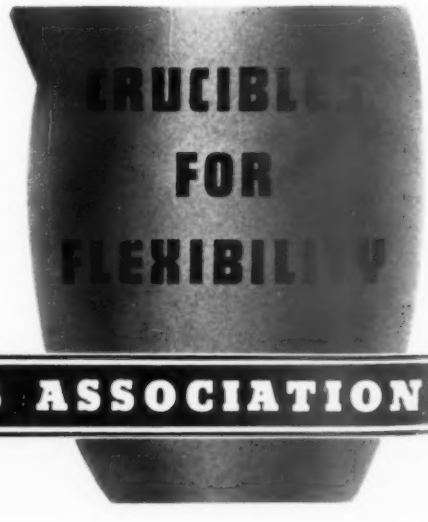
Capable of using oil, gas, or solid fuel.

Capable of expansion of plant to fit closely actual output required.

Operating Note: The tilting type furnace as illustrated requires a vessel for carrying but eliminates the tongs and labor of pulling pots as in the stationary furnace. For best pouring results use a lift-out type crucible of the desired size.

For further information write a crucible furnace manufacturer or to the address below.

*Illustration shows a tilting type crucible furnace, 450 lb. aluminum alloy capacity with a No. 70 standard melting crucible for carrying. (see "operating note" at left below) The photo by Palmer is supplied by OWI.*




**CRUCIBLE MANUFACTURERS ASSOCIATION**

90 WEST STREET, NEW YORK, N. Y.

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BRASS
BRONZE
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Producers of
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Distributors of
INGOT COPPER
PIG TIN
PIG LEAD
The RIVER SMELTING & REFINING CO.
P.O. BOX 5755
CLEVELAND, OHIO
TELEPHONE: FLORIDA 3040

# DELTA

## THE "TEST TUBE" OF THE FOUNDRY INDUSTRY

Illustrated below is a section of a DELTA research laboratory dedicated exclusively to research in foundry practice.

DELTA PRODUCTS for the FOUNDRY are, primarily, PRODUCTS of RESEARCH.

During recent years many important developments . . . valuable contributions to the advancement of foundry practices . . . have originated in DELTA research laboratories.

And there is the matter of problems which arise from time-to-time . . . particularly during wartime when unusual conditions complicate normal production procedure . . . these, too, when referred to DELTA research laboratory, receive concentrated, skilled professional attention until the solution is revealed.

But, to you perhaps, the most important job of DELTA chemists is the everyday vigilance of protecting the standards and quality of DELTA PRODUCTS for the FOUNDRY. Every ingredient of every product is carefully analyzed, scientifically compounded and, before shipment, is thoroughly tested by recognized and approved methods to guarantee absolute satisfaction in actual use.

## DELTA FOUNDRY PRODUCTS

For Steel—DELTA CORE & MOLD WASH

For Grey Iron & Malleable—DELTA GRAKOAT

For Non-Ferrous Metals—DELTA NON-FERRUSKOAT

For Heavy Grey Iron—DELTA BLAKOAT

For Core Joints—DELTA MUDDING COMPOUND

To Eliminate Skin Drying and Dry Sand Mold Work
DELTA SPRAY BINDERS

For Parting—DELTA PARTEX—The Nut Shell Parting

CORE OILS

## DELTA OIL PRODUCTS CO.

MANUFACTURERS OF
INDUSTRIAL AND AUTOMOTIVE OILS, GREASES AND COMPOUNDS
MILWAUKEE • WISCONSIN

# solving 3 foundry problems:

**1—FOR THOSE REQUIRED TO MEET RIGID GOVERNMENT SPECIFICATIONS:** The Globe Iron Co. offers experienced metallurgical service to foundrymen who are obliged to adhere to specifications based on war-time rules. Production that fails to measure up to rigid standards represents waste and delay; avoid this by consulting the Globe experts. It doesn't cost anything.

**2—FOR THOSE WHO FIND IT NECESSARY TO USE A GRADE OF SILVERY DIFFERENT THAN THE TYPE THEY USED IN THE PAST:** Because we can't supply particular types of SILVERY simply on demand, many foundrymen find themselves up against the problem of changing their production methods. We can help these men to adjust their mixes to utilize the new grade in the most efficient manner.

**3—FOR THOSE UNABLE TO SECURE GLOBE SILVERY IRONS:** Certain substitutes are available for those who lack priorities. We can help these foundrymen with other mixes until the time when we can again supply them with GLOBE SILVERY IRONS. In the meantime, our fifty years' experience in the manufacture and use of SILVERY PIG IRON is at the disposal of all our friends and customers.

## GLOBE IRON CO.

JACKSON, OHIO

. . . Reading Value and

# THE FOUNDRY

## Presents the

# First COMPLETE Story

## of the

## 47th ANNUAL A. F. A. CONVENTION AND WAR PRODUCTION CONGRESS

• This June POST-CONVENTION Issue of The FOUNDRY is but one of twelve during the year—editorially outstanding—presenting articles of great value to every foundryman who is interested in keeping abreast of the newest developments in metal casting practice. While The FOUNDRY has always printed the *complete* story of foundry conventions from the beginning, it has never lost sight of the value of including in these "special issues" *all* the features so closely read and of lasting value in any issue.

In The FOUNDRY you get *all* the service and *all* the value in *every* issue. Reporting foundry conventions before and after they take place is always an *added* feature. Go back to your files of past issues of The FOUNDRY—collectively they constitute a printed history of the foundry industry for more than fifty years.

No matter what problem—no matter what activity, you'll always find it in The FOUNDRY.

THE FOUNDRY—

# Advertising Opportunity

# THE FOUNDRY

## Presents the

# JUNE POST-CONVENTION ISSUE

## A SPECIAL ISSUE

## PLUS ALL THE USUAL FEATURES

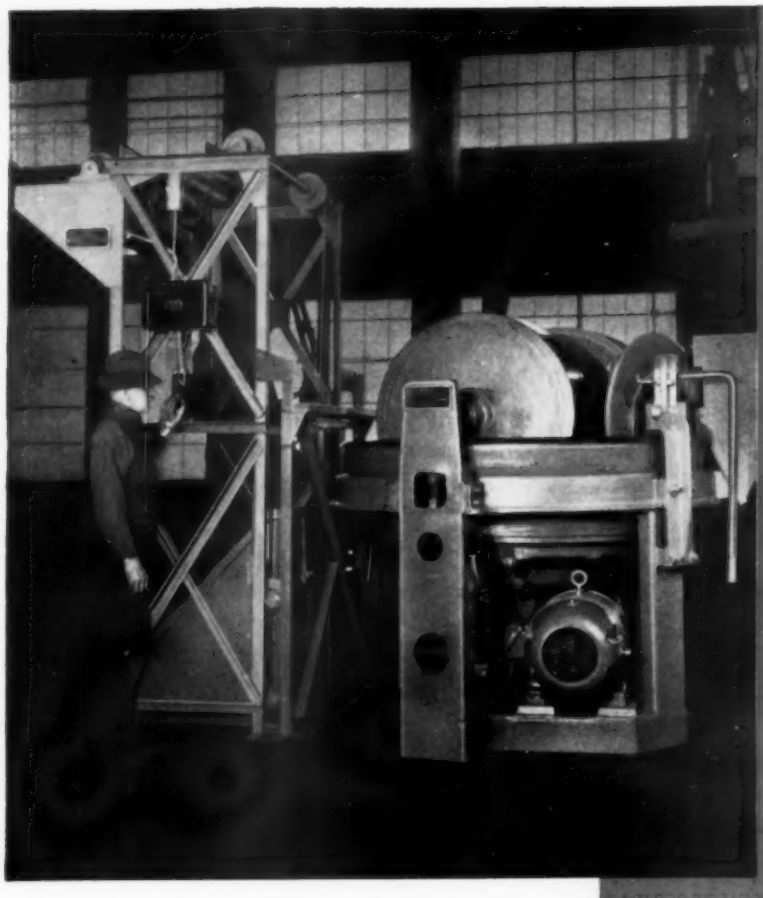
• As an advertising opportunity and to reach *all* foundrymen especially when they are interested in reading the details of the St. Louis War Production Congress, there can be no better time to stress your sales message than in the forthcoming June Post-Convention Issue. Looking toward post-war demands upon the manufacturers of foundry equipment and the suppliers of accessories and supplies, there can be no better time to emphasize present services or to get acquainted with this important metal-working industry.

Get the details of an adequate advertising program *now*. Find out how your name and address appears thousands of times during a year before the exact audience you want to reach. For instance an advertiser using a full page in each issue of The FOUNDRY might present 1,857,600* impressions of his name and address to the foundry industry during a twelve-month period! Ask us about this and other values—values far exceeding the proportionate cost.

Let the June POST-CONVENTION Issue of The FOUNDRY carry your sales message to every corner of the foundry industry!

* Explanation upon written request.

# for JUNE 1943



*The No. 2 Bucket Loader ready for discharge elevation into the "610".*

# CLEARFIELD *Speeds* QUANTITY MIXING IN AMERICA'S WAR PRODUCTION FOUNDRIES

**The Clearfield No. 2 Bucket Loader and the "610" Clearfield Mixer make an unbeatable mixing team for today's busy foundry! The operator simply presses the control button and the independent power-operated Bucket Loader feeds foundry sand quickly and cleanly to the hungry "610" Mixer.**

**Clearfield Loaders built to meet exacting requirements will readily speed up *your* production demands.**

**Clearfield Mixers insure speedy, uniform distribution, even density and good aeration for any type and quality of sand.**

**For Clearfield Data . . . If a definite proposal is desired, state quantity and type of sand to be prepared and characteristics of electric current available.**

**CLEARFIELD MACHINE COMPANY**

**CLEARFIELD PENNSYLVANIA, U. S. A.**

# How Do YOU Dry BIG Molds?

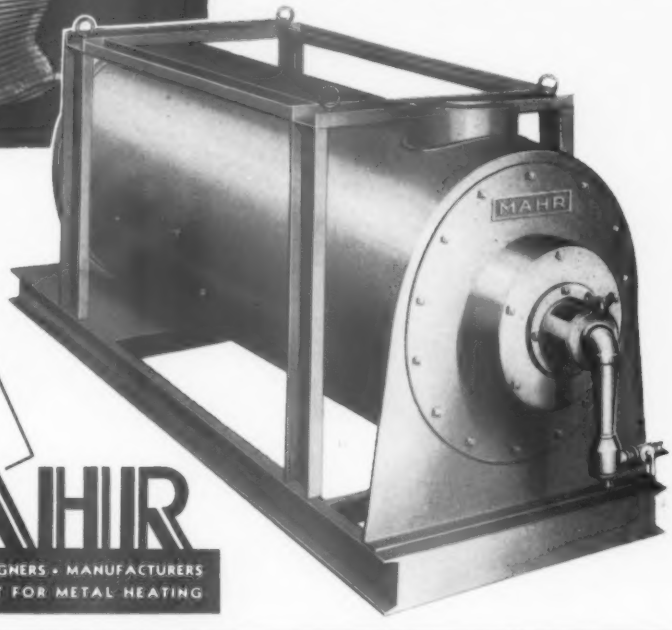
## Here's How One Foundry Cut Drying Time from 45 — 50 Hours to 18!

This huge mold will make a 20,000 lb. casting for a marine motor base. If dried in an oven in the usual way, it would take 45 to 50 hours. With two MAHR Portable Mold Dryers on the job, as shown in illustration at left, the mold was ready for pouring in only 18 hours! That's a big step toward "beating the promise" on delivery—and a real saving in Man Hours.

ANOTHER FOUNDRY SAYS...

LYNCHBURG FOUNDRY CO.
Lynchburg, Va.

"We are using the MAHR Portable Mold Dryer in drying the mold of low pressure cylinder castings, which are ultimately used on our Victory ships. Our old method of drying these molds was to put the entire mold on an oven car, put the car in the oven and dry the mold from 36 to 48 hours. With the mold dryer we are able to leave the molds on the foundry floor and dry them in an average time of 18.2 hours. We like this unit so well that we have ordered another one from you which we are very anxious to receive."



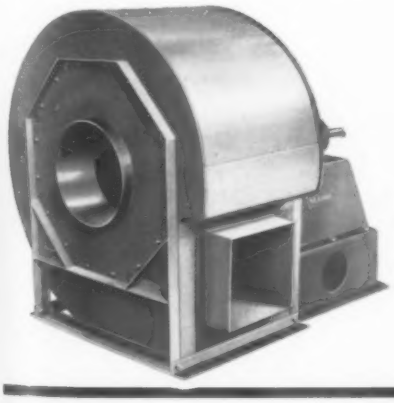

MAHR
ENGINEERS • DESIGNERS • MANUFACTURERS
ALL EQUIPMENT FOR METAL HEATING

## OIL OR GAS FIRED Portable MOLD DRYER

There are many reasons for the sensational performance of this modern MAHR unit. It dries from the inside out, —the sand is baked only to the depth needed from the core. All the sand does not have to be baked through from the outside in. Shake-out is easy, and sand does not necessarily have to be reconditioned after each casting.

Heat-up time is extremely fast. Large volumes of hot gases are forced into every part of the mold for fast, complete drying. Normal drying times are radically shortened.

The entire unit is mounted on a heavy channel steel frame, and can be quickly moved and set up for use on any large mold. Fuel may be either gas or oil. Economy in operation is one of its features because of rapid and complete combustion. Made in 4 sizes—250,000—500,000—750,000—1,250,000 BTU capacity.



## MAHR Temperature Fans

When your recirculating fans on core ovens, heat treating furnaces and other high temperature applications "pass out" on you long before they should—perhaps you get a little hot yourself and say,—"Why doesn't somebody build a fan to stand up to this kind of work?" That's EXACTLY what MAHR has done! MAHR Temperature Fans were designed and built for recirculating hot gases in our own heating treating furnaces—and for that purpose only. No adapting or remodeling, but a rugged, efficient, high temperature fan for work from 800° F. to 1500° F.—and it really does a job! Many exclusive features. 10 sizes, 800 to 40,000 cfm.

**WRITE FOR BULLETINS** on MAHR Portable Mold Dryer—Bulletin 1050. On MAHR Temperature Fans—Bulletin 1070. Or get the whole story from any MAHR representative.

*Sales Offices in Principal Cities*

**MAHR MANUFACTURING CO.**
DIVISION OF DIAMOND IRON WORKS, INC.
**1709 NORTH SECOND ST.** **MINNEAPOLIS, MINN.**

# Announcing....

# IRONTON BERLITE

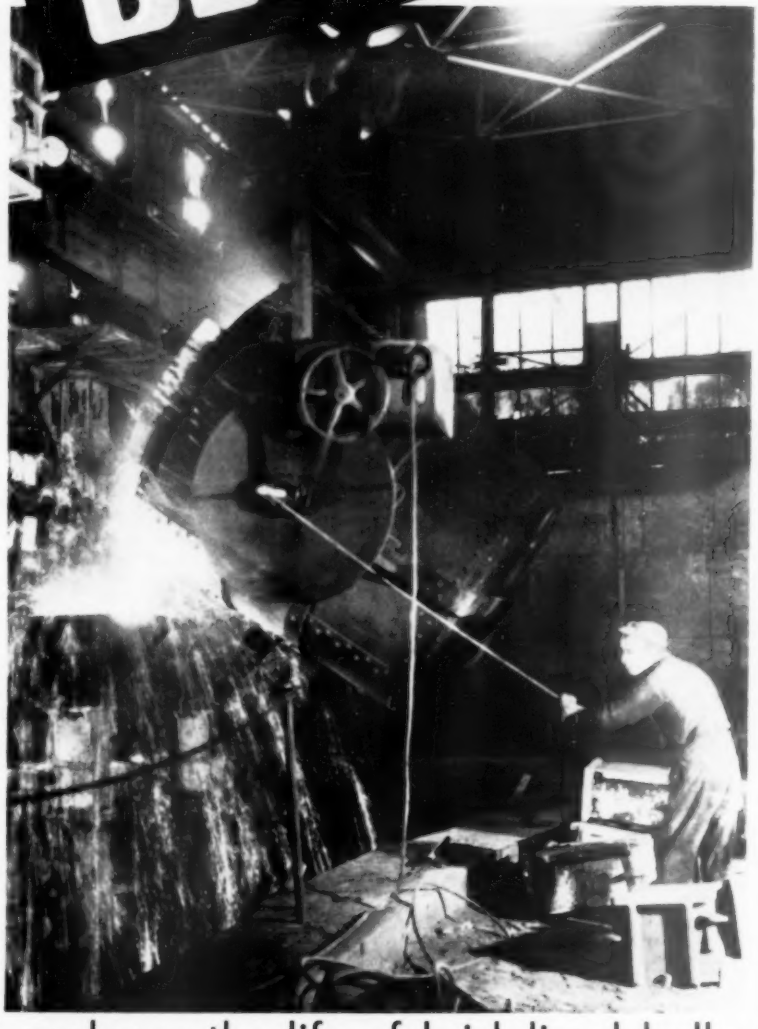
## REFRACTORY BONDING MORTAR FOR FOUNDRIES

"IRONTON BERLITE", a special purpose refractory cement or bonding mortar, developed exclusively for foundry use, meets the foundryman's long sought need of a high-grade bonding mortar, free from chemical fluxes and without the defects of ordinary fire clay.

Service reports from prominent foundries show that this cement actually prolongs lining life in the melting zone and well of cupolas, brick-lined ladles, bungs and sidewalls of malleable furnaces and for electric furnace linings where super-duty fire clay brick are used.

"IRONTON BERLITE" is a smooth working mortar, easily applied, the joints can be made very thin and best of all, this amazing material does not shrink in the joints and actually has a higher fusion point than the brick itself.

Write for full information on this easy-to-use, economical refractory—"IRONTON BERLITE".



**"IRONTON BERLITE"** prolongs the life of brick-lined ladles

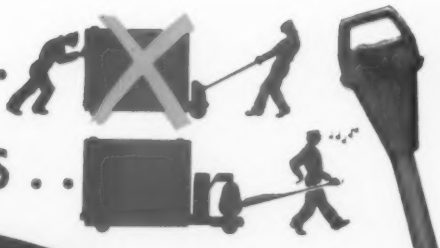
**THE IRONTON FIRE BRICK COMPANY**

RELIABLE REFRACTORIES

IRONTON OHIO

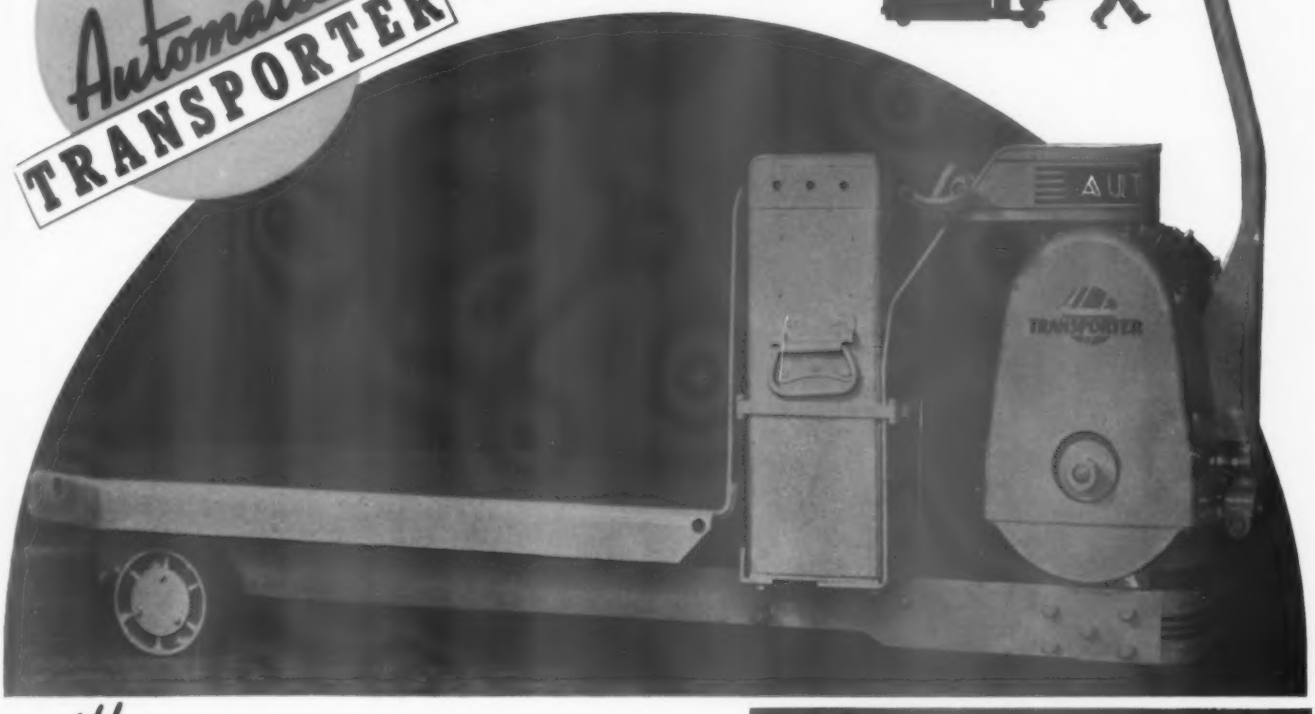
# THE Automatic TRANSPORTER

## ELIMINATES THIS....



## GIVES YOU THIS . .






*with*

★ **POSITIVE MECHANICAL BRAKE**

★ **FRONT WHEEL POWER DRIVE**

★ **CONTROLS IN STEERING HANDLE**

★ **SHOCKLESS HYDRAULIC PLATFORM LIFT WITH EASY FOOT CONTROL**

● This mechanized handling saves waste in manpower and time. The TRANSPORTER performs a vital service in keeping materials moving on those short hauls from one process to another. This mechanized handling of small loads will simplify your entire materials haulage system whether in cramped quarters or narrow aisles . . . it speeds things up and entirely eliminates straining, tugging, pulling, or extra pushing on part of trucker. Full power can be attained in steering at any angle through a 210-degree range, making it easy to break out loads from storage with little maneuvering. Sufficient power is available so that no extra manual push or pull is necessary to help the truck over toe plate humps or elevator ridges.

**AUTOMATIC TRANSPORTATION COMPANY**

DIV. OF THE YALE & TOWNE MFG. CO.

121 W. 87TH ST. CHICAGO, ILLINOIS

MANUFACTURERS FOR OVER 35 YEARS *Electric Propelled* INDUSTRIAL LIFT TRUCKS

**AUTOMATIC TRANSPORTATION CO.**
121 W. 87TH ST., CHICAGO, ILL.

*Gentlemen:* Please furnish complete information on the "TRANSPORTER" without obligation.

NAME_____

COMPANY_____

ADDRESS_____

CITY_____ STATE_____

# *Now Osborn helps mould talons for the eagle . . .*

TWENTY-FIVE tons of big bomber is about to hit the runway . . . with the speed of an express train. And when it does, the crushing, driving force of those 25 tons will be thrown upon a pair of castings so light they can be picked up one in either hand.

These are the bomber's cast magnesium wheel hubs . . . marvels of strength, toughness and light weight; masterpieces of structural design—and a tricky casting job for the foundryman.

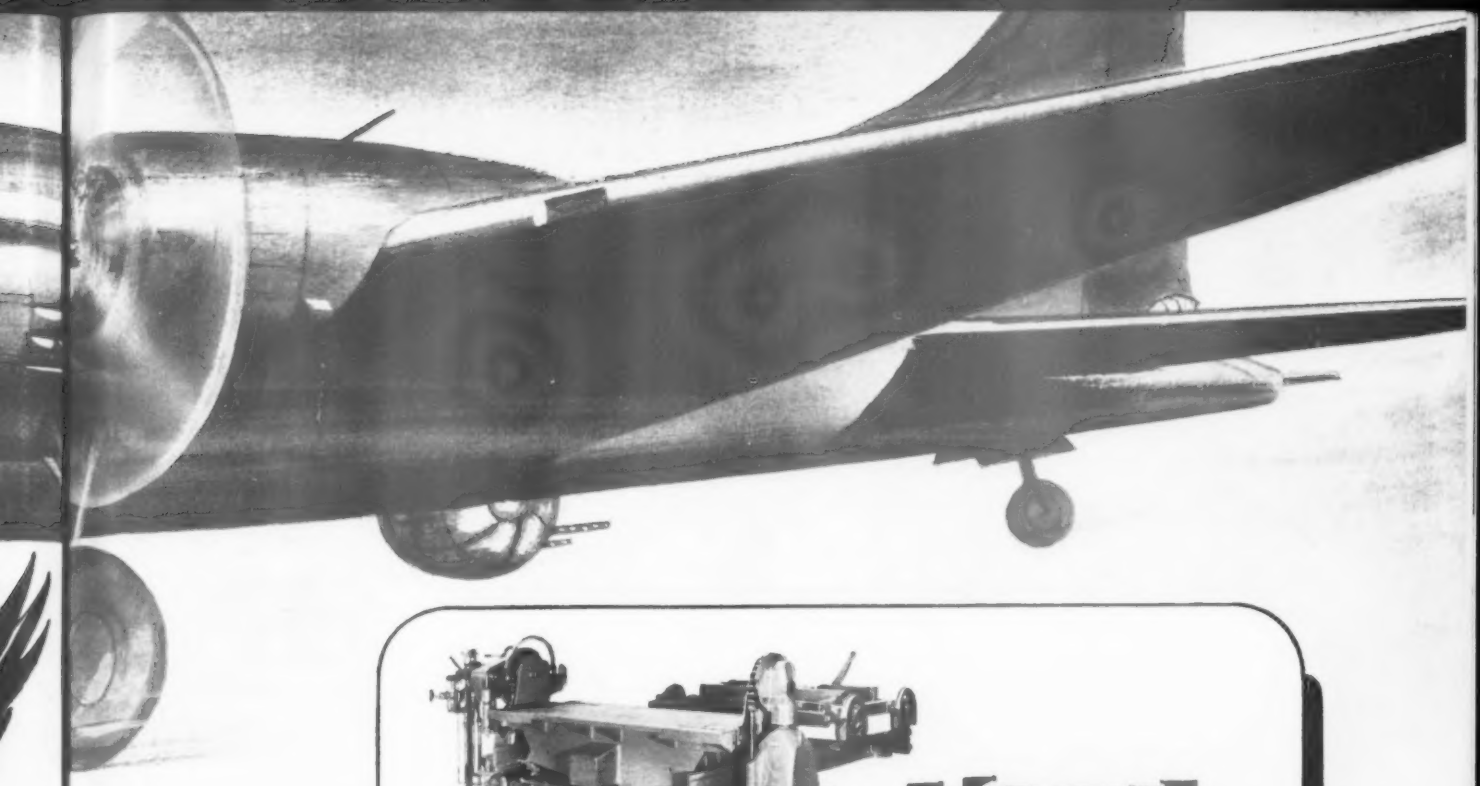
The size and nature of these castings call for moulding machines of exceptionally deep capacity, combined with ease of operation and all the hairline accuracy characteristic of aircraft work.

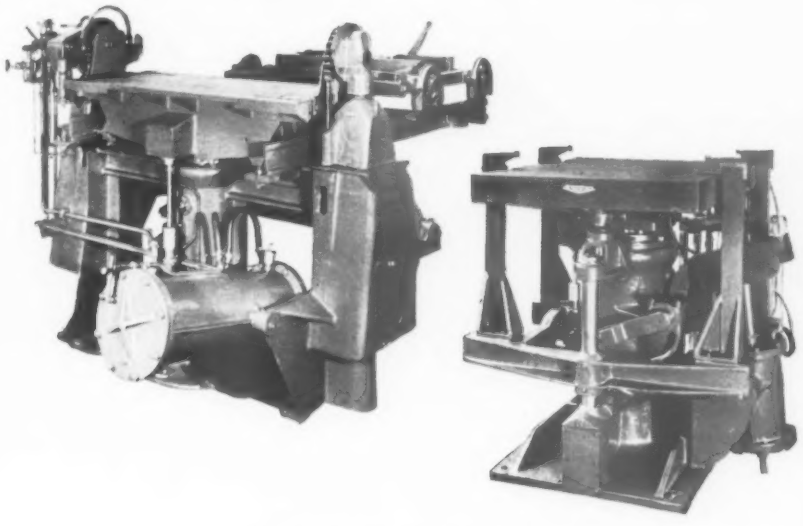
**Precision and Production**—In magnesium foundries throughout the country Osborn Moulding Machines are doing this job smoothly, precisely, and in the volume needed to put the mightiest air fleet in the world squarely over the enemy.

THE OSBORN MANUFACTURING COMPANY

*5401 Hamilton Avenue* *Cleveland, Ohio*

OSBORN





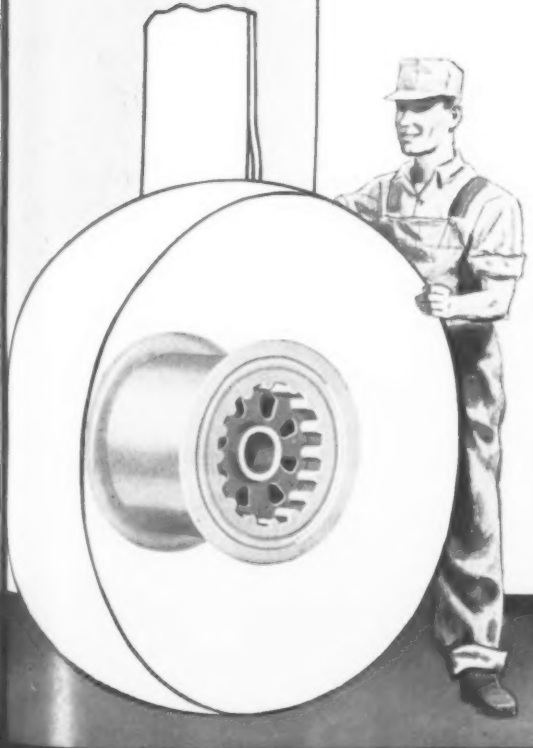
OSBORN Moulding Machines of the types shown above were selected to produce big wheel hub moulds at leading magnesium foundries for two primary reasons:

1. **Their capacity for handling flasks of unusual depth.**
2. **Their ability to turn out accurate, close-tolerance work on a volume basis.**

For the cope and drag Osborn Jolt-Rollover-Draw machines such as that at the left are usually used.

For the cheek mould Jolt Strippers of the type shown on the right are in wide use.

Both meet the demands of the job and the high standards of precision workmanship and smooth performance typical of Osborn design and manufacture.



*THE OSBORN MANUFACTURING COMPANY*
*5401 Hamilton Avenue* *Cleveland, Ohio*

**OSBORN**

**MOULDING MACHINES**

LAST YEAR'S BONDS GOT US STARTED

# THIS YEAR'S BONDS

# ARE TO WIN!

★ Last year saw nearly 30,000,000 workers voluntarily buying War Bonds through some 175,000 Pay-Roll Savings Plans. And buying these War Bonds at an average rate of practically 10% of their gross pay!

This year we've got to top *all* these figures—and top them handsomely! For the swiftly accelerated purchase of War Bonds is one of the greatest services we can render to our country . . . and to our own sons . . . and our neighbors' sons. Through the mounting purchase of War Bonds we forge a more potent weapon of victory, and build stronger bulwarks for the preservation of the American way of life.

"But there's a Pay-Roll Savings Plan already running in my plant."

*Sure, there is*—but how long is it since *you've* done anything about it? These plans won't run without winding, any more than your watch! Check up on it today. If it doesn't show substantially more than 10% of your plant's pay-roll going into War Bonds, it needs winding!

*And you're the man to wind it!* Organize a vigorous drive. In just 6 days, a large airplane manufacturer increased his plant's showing from 35% of employees and 2½% of pay-roll, to 98% of employees and 12% of pay-roll. A large West Coast shipyard keeps participation jacked up to 14% of pay-roll! You can do as well, or better.

By so doing, you help your nation, you help your workers, and you also help yourself. In plant after plant, the successful working out of a Pay-Roll Savings Plan has given labor and management a common interest and a common goal. Company spirit soars. Minor misunderstandings and disputes head downward, and production swings up.

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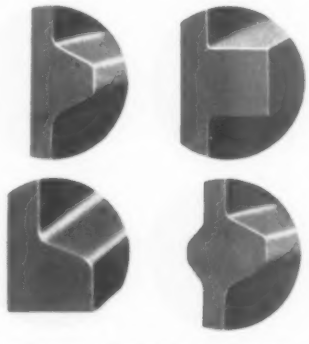

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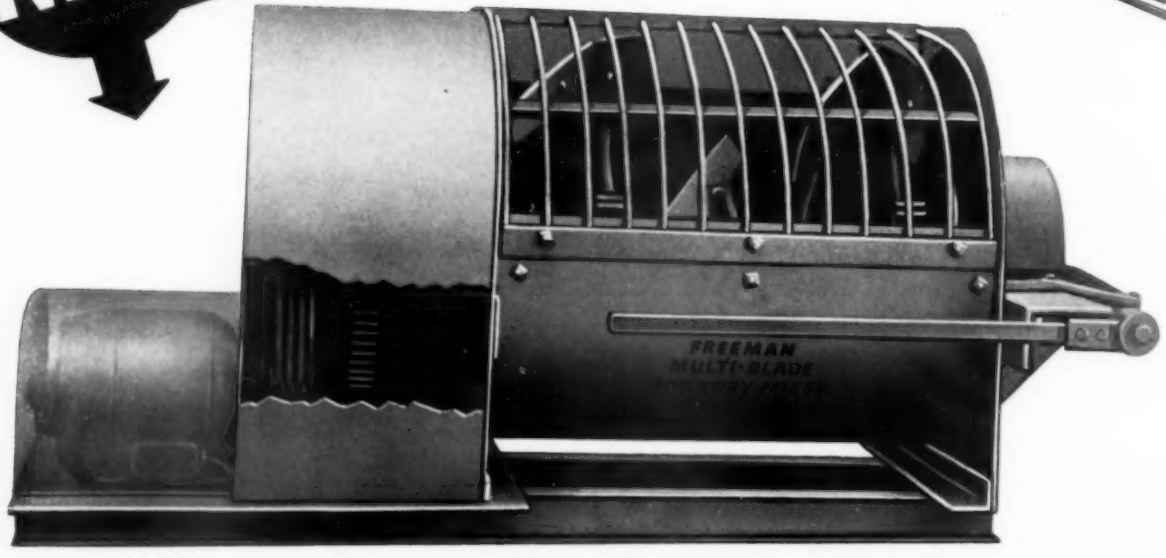


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PATTERN SHOP AND FOUNDRY SUPPLIES AND EQUIPMENT

TOLEDO, OHIO

# New Regulations Complicate Procurement Of Aluminum Pattern Castings

ONCE again foundries and commercial pattern shops are confronted with radical changes in the procedure for obtaining aluminum pattern equipment. Under a new directive addressed to users of pattern equipment made of aluminum, the Aluminum and Magnesium Division of the War Production Board has complicated greatly the problems of the foundry industry by placing the procurement of aluminum castings for patterns under CMP Regulation No. 1, instead of CMP Regulation No. 5 pertaining to maintenance, repair, and operating supplies.

As is described on page 166 of this issue, the new regulations require the filing of Form CMP-4B with the Tools Division for an allotment of aluminum pattern castings before delivery can be made. Since the new regulations now are in effect, and in as much as the forms for allotments for the second quarter were due in February, it can be seen that filing applications now for needs during the remainder of the second quarter places the foundry industry far behind the parade. In fact, applications for allotments for the third quarter of the year now are past due.

The one bright spot in the picture is the fact that the prospective user may supply the required weight of aluminum in the form of obsolete or defective patterns and thus obtain the necessary new pattern equipment. If such metal is supplied, the pattern shop, either captive or commercial, may use aluminum for patterns for quantity production equipment without having a preference rating or CMP allotment. During the next few months, or until the individual plants in the industry can meet the new demands of the Aluminum and Magnesium Division for CMP allotments, the drive to scrap worn or obsolete pattern equipment, including matchplates, patterns, core boxes, core dryers, and snap flasks, may take on added meaning. For this appears to be the only way in which some foundries will be able to obtain necessary new pattern equipment of aluminum.

The most recent outburst of the Aluminum and Magnesium Division on the subject of patterns, the first having taken place early in the fall of 1941, illustrates again the need for a more sympathetic understanding of the scope, problems and requirements of the foundry industry. If it was found desirable, after careful study, to place pattern castings under CMP Regulation No. 1 instead of CMP Regulation No. 5, the industry should have been given sufficient time to file the necessary forms and secure the required allotments before the regulations were put into effect. Practically the entire output of the foundries of the United States is for war work, and nothing should be done by the Washington agencies to curtail the flow of castings to the factories producing war materials.

## Helping the Colleges

WITHIN the next six months, it is probable that technical colleges and universities will be teaching only men in the armed services. Although such schools had record enrollments last fall, the number of civilians has been decreasing rapidly since the lowering of the draft age, and now must of the enlisted reserves of the army are being called as the present semester ends. While this exodus has been under way, the army and navy have been sending large detachments to many schools for special training.

In all probability curriculums for these training programs are being specified to a large extent by the army and navy. Certain courses are being omitted, and others are being stressed, depending upon the particular knowledge which seems to be required by the services. It may be too early as yet to determine the amount of training in foundry practice or in engineering materials that will be given under these war programs.

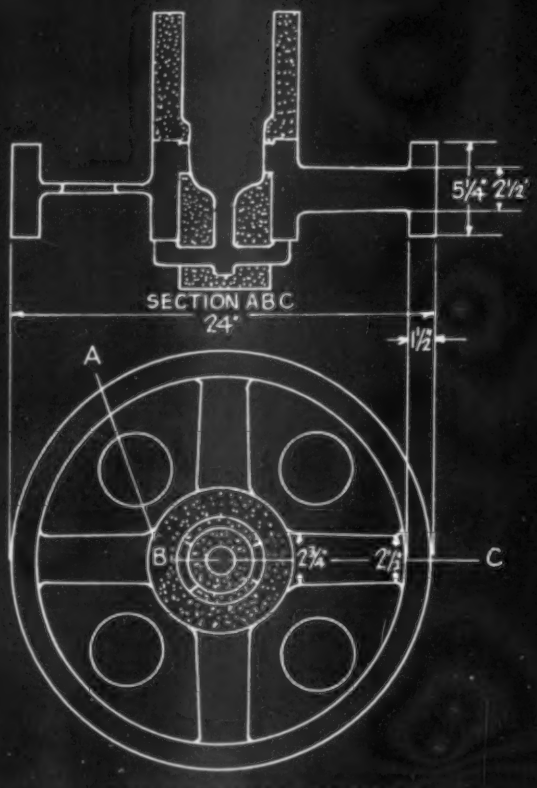
Nevertheless, it must be recognized that these special training programs will have some effect upon the type of engineering instruction provided after the war. For that reason the need for closer cooperation between the foundry industry and technical schools is of great importance. Foundrymen will have to give more than lip service to such institutions if engineering graduates in the period following the war are to know something about foundry practice and, more important still, about the value of castings as basic engineering materials. Most universities need more equipment for teaching foundry practice and even greater amounts of usable data on castings. This must be supplied by the joint effort of foundrymen and the equipment and supply manufacturers serving the industry.

Frank G. Steinebach
Editor

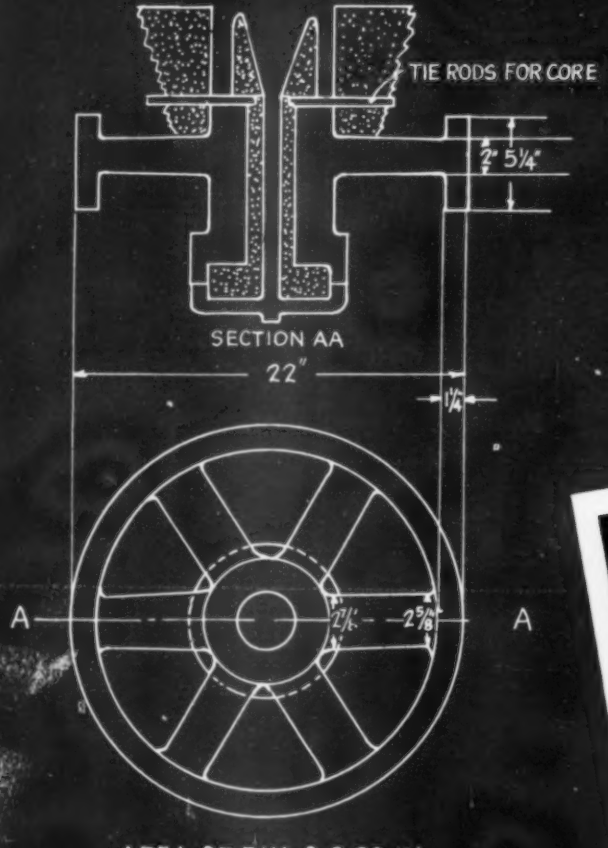
# CENTRIFUGING

# After the mold is filled with steel

By W. F. WRIGHT
and
J. R. CAINE
Sawbrook Steel Castings Co.
Lockland, O.




AREA OF RIM 7.9 SQ. IN.
AREA OF FEED CHANNELS 6.6 SQ IN.
RATIO 1.20-1




AREA OF RIM 6.6 SQ.IN
AREA OF SPOKES 5.5 SQ IN.
RATIO 1.20-1

ONE method of centrifugal casting is centrifuging after filling the mold and consists essentially of making the mold in the usual manner, placing it on a table, filling the mold with steel as in ordinary practice and then rotating the table and mold. That procedure is the closest approach to the standard methods now in use in the steel foundry industry and involves a minimum amount of new equipment in order to use centrifugal force in the manufacture of steel castings.

Flask equipment now in use can be adapted to this method of centrifugal casting simply by making some provision to center the flask on the table of the machine and to clamp it in position while rotating. Sand and molding methods are exactly the same as when the casting is to be made statically. Gating need be no different from the usual practice although it is usually more efficient and economical to use some special gating arrangement if it is at all practical as will be shown later.

Fundamentally, there is no difference in the heading of castings when this process is used. The same laws of directional solidification hold for this process as they do in standard practice. The only difference is that they are applied to take advantage of centrifugal force exerting a definite pressure from the center of rotation to the periphery of the casting being rotated.

### Solidifies From Four Directions

Although based on the same fundamentals, the details of this process differ slightly from some of the other processes and are entirely different from those in the process when metal is poured into a rotating mold. In that case, especially when a metal mold is used, we have directional solidification progressing from one surface only. In the process now under discussion, the mold is filled before rotation and we have the action of centrifugal force during solidification, with solidification from more than one surface, usually from all four directions.

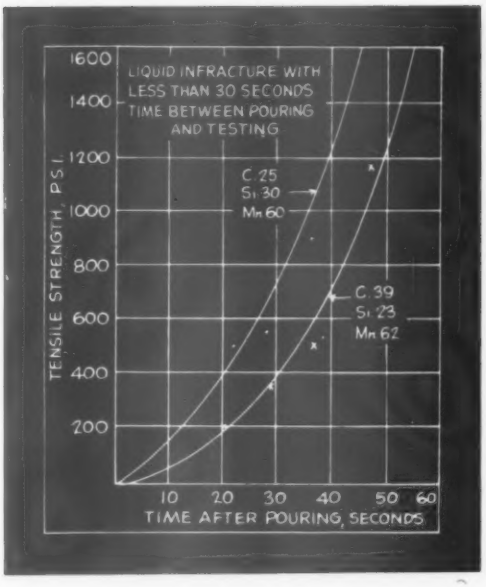
As will be shown later, the primary purpose of this method is the control of contraction during solidification. What we are doing is imposing an additional force to that exerted by atmospheric and hydrostatic pressure in an effort to move metal into voids caused by this solidification contraction.

Centrifugal force tending to displace metal from the center of rotation to the periphery can be found by the formula

$$CF = \frac{w}{32.2} \times r \times \left(rpm \times \frac{2\pi}{60}\right)^2$$

where CF = centrifugal force in pounds, w = weight in pounds, r = radius of rotation in feet, rpm = revolutions per minute. If we use the weight of a cubic inch of metal as the weight, we then have the force per square inch being exerted at any area in the casting due to centrifugal force. This force is trying to force metal into any void between this area and the periphery and is opposed by the strength and stiffness of the partly solidified metal during freezing.

For example, the centrifugal force in pounds per square inch in a 24-inch diameter gear rotating at 92 revolutions per minute will increase from 0 at the center of rotation to 2.5 pounds per square inch at the outside diameter of the rim. This pressure tending to force the metal outward into any void in the rim is superimposed on a force of 14.7 pounds per square inch due to atmospheric pressure and to 1.5 pounds per square inch due to hydrostatic pressure with a head 6 inches high. These forces are opposed by the strength of the partly solidified metal and this strength can be surprisingly high.




### Steel Develops Strength Rapidly

Hall, (1) in a comprehensive study of the physical properties of steel at temperatures up to and through the solidification range, has developed a great many curves showing the strength of this solidified steel. Fig. 4 shows two typical ones for carbon steel. As can be seen, strengths of over 100 pounds per square inch are developed before the metal is completely solid so that even in cases where the forces trying to move metal into voids caused by solidification shrinkage are at their highest, this movement must take place while there is appreciable liquid metal present. Even partly solidified steel possesses too much strength to be moved by any practical method in the foundry.

The fact that solidifying steel does develop strength so rapidly is the basis of one of the major advantages of centrifugal force as a means of overcoming shrinkage during solidification. When a casting is spun this force is exerted on every square inch of cross-section and will cause movement into any void that opens up close to the periphery, even though the outside surfaces of the section have cooled enough to be too strong for the forces involved to overcome.

Most all other added forces—for example, air pressure—cannot affect movement of the solidifying interior without moving the solid exterior. Pressures great enough to move the solid exterior are impractical as they must approach 1000 pounds per square inch, as the metal is coolest and strongest at the surface. Although this added centrifugal force does make it possible to feed a greater length of section from a pool of liquid metal than when this force is absent

*Fig. 1 (Upper left)—Web type gear showing feed channels and center core. Fig. 2 (Extreme left)—Spoke type gear with gate cores. Fig. 3 (Left)—Centrifugal machine in pit. Fig. 4 (Upper right)—Strength developed by steel during solidification*

and to feed one heavy section from another through a thinner section, there are definite limits above which this cannot be done.

This point is brought out in one of the classes of castings best suited for this process gear blanks. This type of casting can be spun and a radiographically sound casting made with no risers feeding the rim. Only one riser is used on the hub, the centrifugal force forcing metal from the center to the rim. However, neither the web nor the spoke type gear can be made solid with the web or spoke thickness as predicted by normal design. It is necessary to increase the spoke thickness and add channels with a greater cross-sectional area to web type gears in order that the strength of the metal in these channels does not increase to such a high value that the feeding action is stopped before the rim solidifies completely. Details of these channels will be shown later.

### Process Presents Many Advantages

The benefits, then, of this process are not only increased yield, but lower molding and cleaning costs. Take blank gears for example. The risers on the rim in addition to those feeding the hub not only decrease the yield, and increase the molding cost, but the cost of removing these risers along with the necessary padding and the increased grinding costs in the cleaning room are so great that many foundries do not like to make this type of casting. This type of blank gear comprises the majority of our centrifugal output. In all cases, only one riser is used, that on the hub. Radiographically sound gears are made without any risers at all on the rim. The riser volume for this type of casting is calculated at 15 per cent of the volume of the castings when the mold is filled. As about half of the metal in the riser just after pouring is used up in feeding the casting, our yield will be about 92 per cent against 50 per cent or less if the casting were made in the usual manner with heads on the rim.

Contrary to a number of assertions regarding increased density of centrifugal castings we have never been able to find any difference in density or physical properties of well-fed cast steel, whether or not it is cast centrifugally. The only difference is in the areas showing shrinkage. The areas showing pipe or center line shrinkage in castings made by this process are much smaller than when the centrifugal force is absent. We seem to have either a definite void or solid metal with very small amounts of metal with low density. In some cases this condition can be a disadvantage. In the case of gears this area of low density is at the base of the teeth and would not be noticed with the usual visual inspection, and in most cases would not impair the usefulness of the part. The same amount of over-all shrinkage in a centrifugal casting would be present as definite voids and cause rejection.

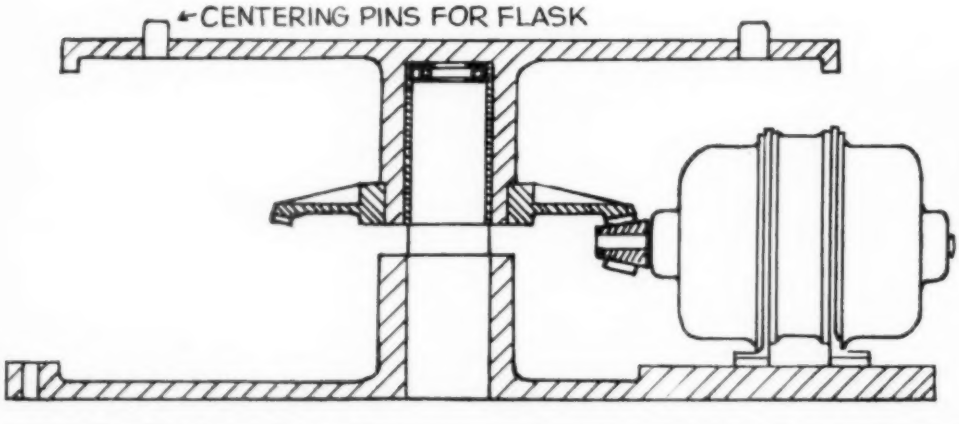
A disadvantage of this process, of course, is the expense of purchase and maintenance of the equipment. It is usually necessary to have enough machines to take care of at least half of the molds required for a heat. If the sections are at all heavy, over 1¼ inches, it will be necessary to have enough machines to handle all the molds for a heat at one time as the castings must be spun until completely solid and they cannot be removed from the tables until that time. As this freezing time will vary from one minute for a 1-inch section, to forty minutes for a 9-inch section, the spinning time must be governed accordingly. Conversely, spinning light sections, say 1 inch and less, is impractical as they freeze so fast, that it is almost impossible to pour the casting, get the ladle away and develop speed before the section is frozen completely.

Another disadvantage is the fact that the flask equipment must be kept in very good shape so that they can be centered exactly on the tables. If the casting is off center as little as ¼-inch the feeding action will not be uniform and shrinkage cavities will be found in the half closest to the center of rotation.

Not all designs lend themselves to this process. In the first place, the casting must be either geometrical about some point, that point to be the center of rotation, or more than one be placed around a center feeding riser, this riser located at the center of rotation. Then, the casting must be designed so that it can be fed from this one riser alone.

Last and not least, the casting itself must be designed for the centrifugal process. If a pattern just is selected at random the chances are that the shrinkage will be more visible due to the fact as mentioned before, instead of shrinkage being spread out—some of it in areas of low

*Fig. 5 (Left)—Section through centerline of centrifugal machine. Fig. 6 (Below)—Casting after shaking out. Fig. 7 (Right)—Proper and improper designs for spoke type gears. Fig. 8 (Extreme right)—Mold on centrifugal table with core in place*



## Typical Results on Centrifugal Castings

| Test No. | Type of Gear | Cross Sectional Area of Rim sq. inches | Cross Sectional Area of Feed Channel sq. in. | Ratio, Area Rim to Area of Feed Channel | Area of Shrinkage sq. in. | Position of Shrinkage |
|---|---|---|---|---|---|---|
| 8 | Spoke | 4.69 | 4.82 | .95-1 | None | ..... |
| 5 | Spoke | 4.38 | 4.47 | .98-1 | None | ..... |
| 11 | Web | 9.00 | 8.50 | 1.05-1 | None | ..... |
| 56 | Spoke | 3.56 | 3.22 | 1.14-1 | 0.38 | Shrinkage only in spoke. None in rim. |
| 108 | Web | 6.76 | 5.93 | 1.14-1 | 0.50 | " |
| 156 | Spoke | 2.40 | 2.03 | 1.19-1 | 0.14 | " |
| 90 | Web | 4.50 | 3.50 | 1.29-1 | 0.79 | Shrinkage extends ¼" into rim. |
| 165 | Web | 4.21 | 3.06 | 1.37-1 | 0.87 | Shrinkage extends ⅜" into rim. |
| 62 | Spoke | 3.38 | 2.25 | 1.52-1 | 0.94 | Shrinkage extends ½" into rim. |
| 76 | Web | 5.84 | 2.40 | 2.43-1 | 4.00 | " |

Castings rotated between 450 and 600 surface feet per minute.

density—it will be present as visible voids. The difficulty that will be experienced with designers in getting them to change the design is surprising. They will object, if for no other reason, than that the casting does not look as it should. This has been one of our major difficulties in popularizing centrifugally cast gears. It is necessary to increase the spoke and web thickness of a normal design and it has taken years to convince the designer that his customer will not object to the looks, even though the designer himself is convinced that this process will give him better gears at a lower cost.

Fig. 5 is a sketch of one of our centrifugal machines. The design has been an evolution over a period of years and is only one of any number of designs that will work, as the only important consideration is to impart a rotating motion to the table holding the flask and casting. In this case a single speed AC motor drives the table through a bevel pinion and gear. We use three size tables with speeds of rotation from 58 to 380 rpm. Speeds of rotation are so controlled as to give peripheral speeds between 450 and 600 surface feet per minute.

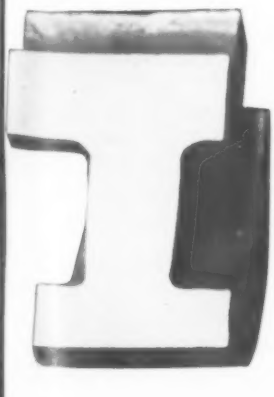
As most of our gears average 24-inches in diameter we use a speed of 92 revolutions per minute on the majority of our centrifugal machines. As the speed of rotation and peripheral speed can be varied by plus or minus 20 per cent without changing the centrifugal force enough to cause an appreciable effect in the feeding action, the flask and casting size also can be varied through this range and one table size handle a number of flask and casting sizes.

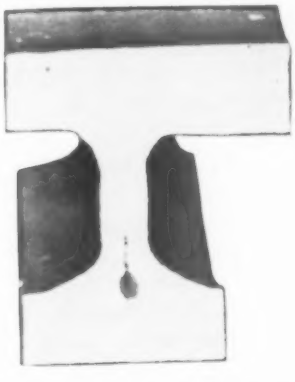
As can be seen from the equation for centrifugal force given previously, the force is in proportion to the square of the speed. So, increasing the speed is by far the most efficient method of increasing this force. However, as the speed of rotation is increased, practical difficulties increase tremendously. The centering of the flask on the table must be much more accurate. The safety hazard if something goes wrong, is a serious problem. Even now with what seem to be relatively slow speeds, we have found it necessary to place these machines in a pit with a heavy metal guard to protect the men when occasionally one of the flasks comes loose. One of the centrifugal machines is shown in Fig. 3.

Since the design, heading and gating for this type of centrifugal casting varies with each part, just as it does if the casting is to be made in the usual manner, it is impossible to go into all details. As over 95 per cent of our work, cast centrifugally, is comprised of gears, spindles and sprockets, and since gears comprise the majority of this class, we will confine our discussion to gears.

Fig. 1 shows the standard design of a web gear for this method of centrifugal casting. Note the enlarged channels leading from the hub to the rim, allowing molten or semi-molten metal to flow outwards until the rim has frozen. The type of combined gate and riser shown is the most efficient when the bore of the hub is large enough to accommodate it. This type of (*Please turn to page* 175)

From a paper presented at the annual meeting of the Steel Founders' Society of America held at the Edgewater Beach Hotel, Chicago, on Feb. 10 and 11.





# WINNING THE WAR— then what?

By ARTHUR J. TUSCANY
Executive Secretary
Foundry Equipment
Manufacturers Association

BOLD indeed is the individual who would attempt to answer even some of the many questions which are being repeated from day to day. Nevertheless, the shape of things to come is dimly evident. The dedication of practically our country's entire industrial machine to the prosecution of the war has taken about a year and is now nearing completion. Stoppage of plant construction, and the tendency to evaluate requirements of actual arms and munitions has shown that the construction phase has just about reached completion and in a few cases may even have exceeded the country's needs. Even with the shift of things that has magnified the requirements for combat equipment of various and sundry types, there is a lag.

Some large aircraft plants are replacing hundreds of thousands of dollars worth of equipment, some of which is being revamped to meet design changes. By and large we may say that the industrial mobilization for war is complete. No one knows how long the accent on war manufacture will continue—any more than one knows when the war will end.

We can feel reasonably sure of one thing and that is that when the war concludes, as it will some day, a reconversion period will confront us. How long will it take us to change over to the production of the thousands of items now under curtailment as "civilian goods"? I am one who feels that it will not take much more time than it did to get under way for war manufacture. Pressure of goods is likely to be as great although of a different character.

We know the population at large is going to be starved for machines and gadgets. Our transportation system from railroads to automobiles will be pretty well worn out. I suspect that every man who turns in a gun is going to want to get aboard something and go some place else.

It seems logical to expect that the automobile industry will swing back first with probably little immediate change in the first models. It will probably haul in the old machine tools and start manufacturing early to take the edge off the first hunger for new cars. The same thing will apply to the other thousands of machines for living, such as ice boxes, vacuum cleaners, washing machines, etc. Many of the "defense houses" will be crying for completion of living equipment such as furnaces, bath tubs, kitchen equipment and the like.

Some of the equipment of war plants quite likely will be found working back through the used tool dealers to peacetime manufacture, but thousands of the special purpose tools and equipment cannot be so salvaged. Certain plant structures, such as cranes, furnaces, presses, etc., will be picked up and adapted to current manufacture.

Our private utilities, water, gas, and electric power, that are now bumping their heads against the WPB "NO" are going to need pumps, pipes, turbines, generators and what not—no end. And farmers will need new agricultural machinery in quantities.

Tieing this down, the outlook for the foundry industry would seem to be encouraging. There will be backed-up demands for all types of goods. Large interests will have huge plants and increased reservoirs of funds. Accumulated demand for repair parts for all types of machines will be noticeable and could have the effect of pushing more of this business out of the captive foundries which will be required to run full capacity for new unit requirements.

But the foundries will also have most of the old and many new problems. We shall have increased our foundry capacity, but what of the competition by other types of fabrication? Among competing industries we shall have with us a large capacity for producing forgings. A sizeable increase in the production facilities of various types of rolled steel will be available. Plastics in many forms will be offered. The new combination of wood and plastic bode more difficulties for foundries.

All of the government training which has been under way during the war by feather-duster apprenticeships which makes Winnie a welder in two months, has given a lot of good publicity to the welding process. Incidentally, I have not learned of an NYA or U. S. Employment Service school giving a corner to training foundry people such as molders, or pattern makers; and the emphasis on aircraft where welding, pressing and so forth predominate has undoubtedly made its impression on the working public as well as the designer.

### Better Merchandising Needed

On different occasions over the past, emphasis has been laid on the need for the foundry industry being more vocal and aggressive in the merchandising department of its business. If that was the situation before the recent upsurge in production facilities of castings of all types as well as competitive fabrications, what situation can we expect to find after the close of the war?

The facts are that casting manufacturers have done an outstanding job in improving their product. Some of the things being done in castings today were just unthinkable a few short years ago. Various trade groups in the industry have much to their credit as has the industry as a whole.

On the matter of merchandising its product, unfortunately there is a different story to tell.

It is recited that in the early days of American industry foundry operators needed to give little attention to the matter of seeking customers. The customers, it seemed, sought the foundries. That may be one reason why casting manufacturers (*Please turn to page* 17

By C. E. BALES
and
F. McCARTHY
Ironton Fire Brick Co.
Ironton, O.

# CONSERVING FOUNDRY REFRACTORIES

FORTUNATELY for the foundry industry, and for this nation in its present war effort, the refractories industry during the past 20 years had enough foresight to carry on research work, with the idea of product improvement, and to carry out programs of plant expansion and modernization. This has made it possible for all foundries in this country and Canada to obtain an adequate supply of high grade refractory materials without any undue delays, despite unprecedented demands.

If the war continues for any considerable length of time, there is a distinct possibility that a shortage of refractories may develop, due to difficulty of securing repair parts for brick plant equipment, manpower shortages, inability to take time out for kiln repairs, etc. So far the War Production Board has granted high preference ratings to refractories plants and has seen to it that they secure the necessary equipment and supplies to carry out the manufacture of these highly essential materials. What the situation will be a year from now, no one can tell. Therefore, it becomes necessary to give some consideration to the conservation and reclamation of refractory materials in foundry practice.

Refractories today are far better both in quality and workmanship than they were in World War 1. This is especially true of malleable furnace brick, and it also applies to cupola blocks, as most of them now are made by machine methods which give much harder, denser, tougher blocks. With better refractories, the foundryman *should* be able to obtain longer life from his furnace linings, his costs should be lowered and his castings should be cleaner. Efficient operation of the melting furnaces *will* enable the operator to secure these desired ends.

### Cupolas Operated Scientifically

The cupola is the heart of the foundry, although some people consider it the rear end. It is one of the oldest furnaces for melting iron for castings, but it is still the most convenient and economical of all, and therefore the most widely used. The regrettable thing about cupola operation is, that it has remained an art for so many years, instead of a science. Great strides are being made, however, both in large production shops and in the progressive smaller foundries, and more scientific knowledge exists today on correct cupola operation than ever before.

One of the most essential things in efficient cupola practice is selection and proper installation of the right type of lining. Many types of fire clay are available for cupola block manufacture, but the best blocks are made from those clays mined in Kentucky, Missouri, and Pennsylvania. Blocks should be made by the stiff mud, machine pressed method, as this process gives a much harder, denser block than those molded by hand. Standard 9 x 6 x 4 blocks are easily made by the stiff mud method, and it has been our experience that they are the most desirable and economical for general foundry use. Some foundries using very large cupolas prefer 9 x 9 x 4 blocks. These too, can be made mechanically, but the Colliau blocks, 9 inches high, giving a 4½-inch lining are generally hand made.

Wherever the size of the cupola will permit, we favor a double lining of 9 x 6 x 4 blocks up to the charging door. This 12-inch lining offers a number of advantages. First, there is a substantial factor of safety. If production demands it the cupola can be stepped up to its limit without any fear of burning through the lining. It is easier to patch against a solid block lining and since the heat loss will be less, the operator can secure hotter iron and possibly use less coke. Between the lining and the cupola shell, we recommend a clearance of about ¾-inch to take care of the expansion of the blocks under heat. This open space can be filled with clay grouting to act as a cushion.

During the past year we have found that cupola blocks will last longer in the well and melting zone if they are laid up with super-quality, refractory bonding mortar, instead of ordinary fire clay. This is accounted for by the fact that foundry clay usually has a lower fusion point than the block lining; it shrinks in the joints permitting joint corrosion, and it offers very little bonding power to the lining a few inches back of the hot face. High grade, refractory bonding mortars of the proper type have a higher fusion point than the blocks themselves; there is no joint corrosion, and the lining is thoroughly bonded together. This is a definite advance in cupola lining practice. We recommend that cupola blocks always be laid with thin close joints.

Above the charging door, we recommend the use of 9 x 4½ x 2½ circle brick of the proper diameter to fit the shell. These brick can be laid up in a mortar of ground fire clay. Some foundries use 9-inch straights placed on end to give a 2½-inch lining, while others use a combination of 9-inch straights and arch brick laid on end to give a 4½-inch lining. The circle brick lining is preferred as it gives a much more substantial job and will last indefinitely.

After the cupola has been completely lined, it should be thoroughly dried out with a wood or coke fire before running the first heat. This will prevent the hard, dense, machine made cupola blocks from spalling or flaking off. When the drying operation is completed, the cupola should then be put into operation as soon as possible.

After every heat some patch- (*Please turn to page* 180)

# Cores for Magnesium Castings

By N. M. BRISKIN
and
GEORGE WALKER
Magnesium Foundry
Ford Motor Co., Dearborn, Mich.

The second and concluding article taken from a paper presented at the Jan. 21, 1943 meeting of the Detroit Chapter of the A.F.A.

VARIOUS types of core binders are in use today in magnesium foundry practice, and considerable research is under way by foundry supply manufacturers in an attempt to perfect a binder which will embody more of the essential properties required.

At the present time the most commonly used binders are those ordinarily employed for other foundry work. Those include, of course, drying oils, cereals, rosins, wood or petroleum resins, and to some extent also synthetic resins. Some use has also been made of starches and sugar solutions as indicated in German patent No. 607523. All of these binders usually are combined with bentonite or natural clays for green strength.

Main difficulty with many core binders when used for magnesium cores is that the heat capacity of magnesium is insufficient to cause them to burn out and to allow the core to disintegrate at the proper time. An ideal core binder for magnesium work probably would be one which would migrate to the surface of the core while baking, leaving a hard crust for handling, and a soft center for easy collapse. Furthermore, if the binder is such that it can be baked thoroughly at lower temperatures it will be more likely to disintegrate at 400 to 800 degrees Fahr. in the hot casting. The lower baking temperature also would help prevent the volatile sulphur and boric acid from being driven off during the baking process.

To achieve the effect of a hard crust and soft center, it has been the practice in England and Germany in some cases to bake the surface of larger cores only to a limited depth, leaving the interior moist, according to *Technology of Magnesium and Its Alloys*, by A. Beck. However, gases evolved from a moist core may be quite dangerous from a standpoint of possible blow holes, if for no other reason. Skin-dried green sand cores have been used to some extent, but these do not permit rough handling and storage as do those made of dry sand.

Several binders, especially of the resin type, now on the market have the desired property of migrating to the surface while baking, and tests conducted by making mixtures using no sulphur often show excellent results. However, when sulphur is added as a protective agent it seems to counteract the desired effect of these binders by fusing and hardening the core throughout. In some cases sulphur has been left completely out of the sand mixture and only boric acid or a fluoride spray used for protection. However, other objectionable properties have prevented many of these newer binders from achieving wide-spread use. The primary objections to most of these binders are too rapid air drying, sticking in the core-boxes or to the conveying belts and hoppers, and objectionable formaldehyde fumes during mixing and baking.

Consequently, in order to have positive assurance of attaining a core with a soft center and hard crust, we have found it advisable to make a core with a weak center and obtain the crust by spraying the green core before

*Fig. 3 (Left)—View of the magnesium foundry core room showing the blowing machine and vertical type core ovens in the background. Fig. 4 (Above)—Portion of the core room showing some of the benches for small work. Any one of seven core mixtures may be conveyed from the mixers to the benches by belts and plows*

baking with a water-repellent drying oil. The binder used may be any ordinary good core oil used in the correct proportion to give the necessary dry strength and hot strength. Naturally, preference should be given to an oil producing a minimum of gas. At Ford Motor Co. we use an oil with a petroleum resin and soy bean oil base.

Surprisingly enough, laboratory tests have shown that crust-producing sprays will not increase the hot strength of the core to any measurable extent. For this spray, petroleum- or pine-wood-resins, kerosene-and-linseed-oil, mineral polymers, and dextrin all have proved more or less satisfactory, although the best spray is one which will be water repellent after drying and not absorb moisture from the air. Also from a practical standpoint, the spray should be easy to (*Please turn to page* 183)

**Table III**

## Magnesium Foundry Core Sand Mixtures

| Mixture No. | Silica Sand Lbs. | Sharp Sand Lbs. | —Bentonite— Western Lbs. | Southern Lbs. | Mogul Cereal Lbs. | Sulphur Lbs. | Boric Acid Lbs. | Dextrin Lbs. | Core Oil Qts. | Water Qts. | PHYSICAL PROPERTIES Dry Perm. | Dry Hard. Crust Spray | Dry Tensile Crust Spray | Green Comp. P.s.i. | Hot Comp. Strength @ 750° F. P.s.i. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1—(Reg.) For outside cores | 900 | | 4 | | 7 | 4 lb.-8 oz. | 4 lb.-8 oz. | 2 | 3¾ | 9 | 200 min. | 40-75 | 85-110 | 2.0-2.5 | 120-150 |
| 2—(Weak) For large internal cores | 900 | | 4 | | 7 | | | | 1 | 9 | 200 min. | 0-25 | 25-40 | 2.0-2.5 | 40-75 |
| 3—Blowing Machine | | 900 | 4 | | 6 lb.-13 oz. | 4 lb.-10 oz. | 4 lb.-10 oz. | | 5 | 9 | 200 min. | 65-75 | 125-150 | 2.0-2.5 | 200-300 |
| 4—(Slab Mix) or Silica-Blowing Mach.: For bench work on cores req'g. more strength than No. 1 | 900 | | 4 | | 8 lb.-13 oz. | 4 lb.-8 oz. | 4 lb.-8 oz. | | 5 | 10 | 200 min. | 65-75 | 125-150 | 2.0-2.5 | 200-300 |
| 5—(Pipe Sand) For tall thin cores which might tend to sag | | 900 | | 4 lb.-3 oz. | 6 lb.-5 oz. | 4 lb.-8 oz. | 4 lb.-8 oz. | | 4 | 10 | 200 min. | 50-65 | 100-125 | 2.0-2.5 | 200-300 |
| 6—(Print) For core prints and locator | | 900 | | | 10 | 4 lb.-8 oz. | 4 lb.-8 oz. | | 5 | 10 | 200 min. | 75-90 | 225-300 | 2.0-2.5 | 250-350 |
| 7—(Special Weak) For internal cores which will not warp or sag | 900 | | 12 | | 8 | | | | | 13 | 300 min. | 0-10 | 25-40 | 4.0-5.0 | 75-100 |

By PAT DWYER

# Canadian Foundry Specializes in Nonferrous Castings

MANUFACTURE of nonferrous castings is one of the oldest if not actually the oldest of the industrial arts practiced by man. Archeologists rooting around and digging into the Far East cradle of the human race—when the digging was done with pick and shovel, and not with explosive bombs—have discovered castings that were made as far back as 3000 years before the Christian era.

The history of brass and bronze and their component alloys copper, tin and zinc is a fascinating subject, even if most of our knowledge is based on tradition and legend. Sacred and profane history have many references to remarkable castings, but are silent or extremely vague on the methods of making the molds or melting and pouring the metal. Every person is familiar with the story of the Golden Calf, sometimes flippantly referred to as the earliest example of the adoption by a people of the gold standard. Does any person know definitely whether this

*Fig. 1 (Above right)—Cores in wide variety are made in a well lighted and well ventilated core room. Fig. 2 (Below)—An attendant stands in front to skim the ladle and shake sulphur dust over the magnesium. The size of the ladle easily handled by two men indicates the extreme lightness of this comparatively new metal*

interesting casting weighed a pound or 1000 pounds? Was it the size of a watch charm, a paper weight, or the size of a healthy young bull calf at the age of one month, six months or a year?

Foundry procedure for thousands of years was conducted by the well known rule of thumb, with every man making castings to suit himself. If the customer did not like the product, he was told politely but withal firmly, that the casting was O.K. and what was he going to do about it?

Late in the nineteenth century, the customer, who by that time had begun to roll up quite a majority, indicated he was going to do quite a bit about it. The engineering fraternity designing mechanical equipment to utilize water, air, steam and electricity began to set up standards and specifications to which castings had to conform. Introduction of aluminum shortly before the turn of the century opened an entirely new field, while the discovery and exploitation of magnesium, lightest of all known metals, in recent years has imposed problems which demand on the part of the foundryman an intimate knowledge of metallurgy and the highest degree of technical skill. The problem under present conditions is further complicated by the necessity of producing a maximum volume of castings in a minimum period of time with existing buildings and equipment and in the face of stringent allocations of metal, fuel and other raw materials.

Modern foundry technique, in which science and art are combined with the practical skill of the melter and molder, is exemplified at the plant of Robert Mitchell Co., Montreal. The one-story foundry building—70 x 200 feet, amply lighted and ventilated—is laid out and equipped to facilitate production in a straight line, from reception of raw materials at one end to shipment of finished castings from the opposite end. A second story above the cleaning, inspection and shipping department houses the shop offices and a modernly equipped chemical and physical testing laboratory where accurate control is exercised over all material coming into the plant, and over all castings going out. A prominent feature in the control system is an x-ray department which aids in the diagnosis and suggests the remedy for certain forms of

*Fig. 3 (Left)—Method of gating this green sand mold for a magnesium casting represents general practice where the metal flows through a long runner at the joint of the mold and then drops down behind a core to enter the mold cavity through a number of small gate openings. Fig. 4 (Below)—This large bronze pump body is poured through the riser*

*Fig. 5—The cleaning room is adequately equipped to handle brass, bronze, aluminum and magnesium castings in wide variety and volume*

internal defects which were not even suspected by a former generation of honest old nonferrous foundrymen. Peace to their ashes.

One room in the control department contains thousands of case histories covering routine and experimental work, properly filed and indexed. Modern customers, particularly army, navy and aircraft authorities, require castings that not only must conform to the closest dimensional accuracy, but also must meet exacting chemical and physical specifications.

While the foundry is all under one roof, a section at one end is partitioned off to serve as a furnace room containing five revolving type, horizontal electric furnaces, three of 1000 pounds capacity each, and two of 350 pounds capacity each. These are supplemented by two oil-fired, tilting type crucible furnaces of 350 pounds capacity for melting bronze, and six stationary type oil-fired furnaces for melting aluminum. A monorail system carries metal to all the molding floors. A pit type, oil-fired crucible furnace which takes a No. 70 pot is located at the opposite end of the molding department close to the floor where the magnesium castings are made.

The furnace room also houses a cupola and auxiliary equipment employed at a time when the company carried on the production of special alloy iron castings. This branch of the business has been suspended for the duration of the emergency.

The main or central part of the building is devoted to molding and coremaking. Small castings are made on a row of floors which extend from a wide central gangway to a battery of molding machines and benches set up close to one wall of the building, in this instance a practically continuous window. Some of the patterns and pattern plates are metal, but the majority are made from a proprietary material mixed with water and poured into sand molds. The pattern equipment solidifies and is ready for use in a few hours. This part of the work is carried on in a room on the second story, equipped also for the production of orthodox wood patterns and for the repair and —where necessary—alterations and additions to existing patterns.

Molds for medium weight and heavy castings are made on a long floor on the opposite side of the main gangway where a traveling crane is available and where many of the molds are made under a sand slinger. The greater part of the remaining space on this side of the foundry is occupied by the core room and the core and mold drying ovens. Large molds are assembled and poured in a pit.

Castings are cleaned, inspected and finished in the third section of the foundry. One (*Please turn to page* 186)

Table I

## A.S.T.M. Tentative Specifications for Magnesium Base Alloy Castings

| Alloy | Magnesium per cent | Aluminum per cent | Manganese per cent minimum | Zinc per cent | Silicon per cent maximum | Copper per cent maximum | Nickel per cent maximum | Iron per cent maximum | Other impurities per cent max |
|---|---|---|---|---|---|---|---|---|---|
| 2 | remainder | 9.0 to 11.0 | 0.10 | 0.3 max. | 0.3 | 0.05 | 0.03 | | 0.03 |
| 3 | " | 11.2 to 12.8 | 0.10 | 0.3 max. | 0.3 | 0.05 | 0.03 | | 0.03 |
| 4 | " | 5.3 to 6.07 | 0.15 | 2.5 to 3.5 | 0.3 | 0.05 | 0.03 | | 0.03 |
| 11 | " | | 1.20 | | 0.3 | 0.05 | 0.03 | | 0.03 |
| 14 | " | 9.0 to 11.0 | 0.10 | 0.5 to 1.5 | 0.3 | 0.05 | 0.03 | | 0.03 |
| 17 | " | 8.3 to 9.7 | 0.10 | 1.6 to 2.4 | 0.3 | 0.05 | 0.03 | | 0.03 |

# British Foundry Concentration Program

UNSATISFACTORY

A special study prepared for THE FOUNDRY

MANPOWER, in Great Britain at war, is the responsibility of the Ministry of Labour and National Service. The head of this department must decide, on the recommendation of various advisory panels, whether a man will be directed to the armed forces or to essential civilian jobs and particularly to war industries. The problem is one of extreme complexity, not only because both the forces and essential industries require the greatest number of men available, but also because many skilled mechanics are essential to the service, maintenance and repair of airplanes, tanks and other mechanical equipment that are the tools of war.

Various methods are being used to make available and to select the type of men needed in essential war industries. During the early part of the war physically fit men up to a certain age were liable to be called up, but a system of block reservations was instituted, by means of which various categories of men were left to their industries and were given a period of deferment up to a certain age which varied according to the essentiality of the industry.

### Individual Deferments Granted

Later the system of block reservations was replaced by the granting of individual periods of deferment for men engaged in essential jobs, the position being reconsidered at the end of each period of deferment.

Output of luxury or semi-essential industries has been more or less seriously curtailed by the Limitation of Supplies Order and the control of raw materials. This releases a number of workers who are directed either to the armed forces or for training in more essential industries.

Another method of restricting nonessential production is by concentration, or the closing down of certain factories and transferring their production to others. This procedure is applied mainly to the production of luxury and nonessential articles, but it has also been used in the iron and steel industry in connection with the manufacture of tin plate and sheets.

Concentration has also been tried in the iron foundry industry, but after it had been effected in one district and investigations had been carried out in other regions, it was found that the results did not justify the disturbance caused on production, and the system was dropped by common agreement. The experiment, however, is worth relating, as it has brought to light certain interesting aspects of the British iron foundry industry.

The reason why the attempt was made to concentrate iron foundry production was that the light castings section of the industry, comprising mainly rainwater pipes, ranges, baths, etc., was not working to capacity, and these products were not essential to the war effort. It was thought, therefore, that the limited tonnage needed of such castings could be made by a relatively few well equipped foundries which would take over the output of the less well equipped or less efficient foundries. There were other small foundries scattered over the country, production of which was useful, but which were not working to capacity for a variety of reasons. It was thought that the output of such plants could also be absorbed by larger foundries with only a small additional labor force. However, the wide variety of castings made under considerably varying conditions was an obstacle to such transfers, and this was the main reason for abandoning the scheme.

What may be termed the charter of concentration of production is contained in a White Paper presented to Parliament by the President of the Board of Trade in March, 1941. In general, the object of concentration is to avoid large scale part-time working and to concentrate production in a reduced number of factories working full time, thus obtaining more all around efficiency. This means the closing down of firms whose production, or that part of it which is essential, is transferred to a so-called "nucleus" firm.

### Anticipate Future Operations

Among the conditions set out by the White Paper are the following: The closed factories must be kept ready to start up again as soon as possible after the war. Nucleus firms receive a certificate, which establishes their status and affords them a certain measure of help in obtaining labor and raw materials, and, as far as possible, safeguards them from having their premises requisitioned. In return, nucleus firms are expected to compensate the firms whose factories are closed down, through voluntary arrangements subject to government approval; such compensation cannot be met by the use of public funds, but nucleus certificates are only granted subject to a satisfactory compensation scheme being agreed upon.

The Board of Trade is the government department charged with the application of concentration to industry.

In regard to the iron foundry industry, it was thought that concentration of production would bring about the following results: Release of (*Please turn to page* 190)

# 68 years A FOUNDRYMAN

MORE than 65 years ago, a young apprentice poured his first casting at the foundry of Langley Mill Engineering Wheel & Wagon Co. at Langley Mill, England. The making of castings has occupied him continuously since that time, and today, at 81, he is president of one of this country's leading steel foundries—a company in which his three sons also are officials. His long record of active association with the industry as a practical foundryman and executive is unique in the history of the castings business.

The boy whose father signed him as an apprentice to the molding trade in England in 1875 was Joseph W. Harrison, now president of Harrison Steel Castings Co., Attica, Ind. Born in White Horse Lane, London, on Oct. 4, 1861, his family moved shortly thereafter to Heanor, Derbyshire, where he spent two years in a local school before going to work in a hosiery factory at 10 years of age. Four years later he started his apprenticeship with the Langley Mill foundry, a producer of gray iron, brass and crucible steel castings.

His first job in the foundry was mixing and screening molding and core sand. Next he was transferred to the core room and six months later was assigned as helper to several molders in the foundry. The first mold and casting he was permitted to make—a small brass bearing—was an important milestone in his apprenticeship which he vividly recalls.

Then came a period in the crucible steel department, which consisted of a battery of furnaces arranged in a row about 4 feet apart with two pots to a furnace. The furnaces were heated with coke, employing a natural draft. Pots were clay, kiln dried and immersed in a fine coke fire to be burned over-night to a cherry red heat. After being placed in the hot furnace they were surrounded by coke, and a measured amount of small pieces of scrap was poured into the pots through a funnel pipe. The draft then was turned on for 5 or 6 hours to melt the charge, after which manganese, silicon and high carbon metals were

*Associated with Mr. Harrison as officers of Harrison Steel Castings Co. are his three sons. Left to right below: Roy J. Harrison, vice president and works manager; Glen W. Harrison, secretary and sales manager; Wade C. Harrison, treasurer and in charge of purchases*

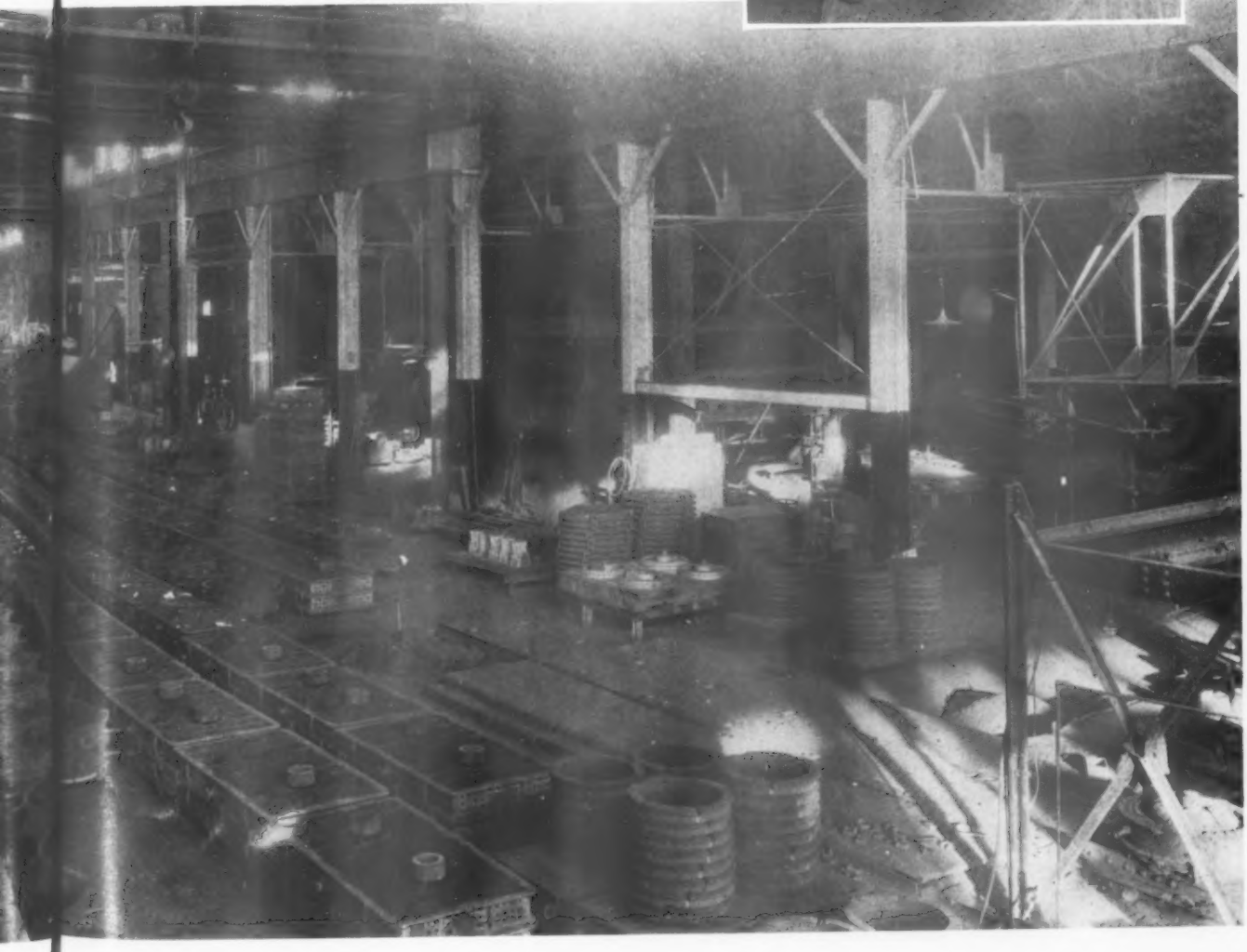
added. Castings made of this steel were car wheels, 12 to 15 inches in diameter with a 3-inch tread, used on coal mine cars.

After working for two years on green sand molds for steel castings, the young apprentice was sent back to the iron foundry and given a helper and a large pattern to mold under the main crane. This crane was of the jib and mast type, set in the center of the foundry so as to swing in a circle and transfer metal from the cupola to the molds. Other cranes, all hand operated, were located so that flasks, molds and castings could be transferred from one crane to another.

Completing his seven-year apprenticeship, the journeyman molder continued to work for six years as a leading molder in gray iron, when the lure of opportunities in America induced him to sail for the United States. Arriving in Baltimore 55 years ago this month, Mr. Harrison joined his brother who was located at Wilkes-Barre, Pa., and found his first job in this country in the foundry of the Lehigh Valley Railroad Co.

His next move was to the Buckeye foundry at Salem, O.; then to Alliance, O., with Solid Steel Castings Co. Association with the latter was (*Please turn to page* 194)

*Joseph W. Harrison, president of Harrison Steel Castings Co., entered the foundry industry as an apprentice in 1875. Below is a view of the pouring floor of his Attica, Ind., plant*



## Wants To Eliminate Ramming of Copes for Flat Back Jobs

We shall appreciate any suggestion regarding material for a permanent or semipermanent cope that would eliminate the necessity of ramming green sand copes for flat back jobs.

Possibility of using all or part of a mold several times in succession has engaged the attention of practically all foundrymen at one time or another. Partial solution of the problem has been found in some instances, but where modern high speed molding machines are available, as in your case, the green sand cope is more satisfactory from an economical and practical viewpoint.

In recent years the so-called permanent or long life mold has been developed to a fairly high degree for the production of certain types of gray iron castings. The working face of the metal mold is painted with a thin clay coating and smoked with an acetylene torch. An iron cover plate with the face treated in this manner might meet your present requirements.

It is common practice in many foundries to use a dry sand cover core, or a loamed plate several times. Length of service naturally will depend on the length of time the cover remains in contact with the casting each time it is used. Alternative materials include cement bonded sand, and any of the high temperature plastic materials usually employed for lining furnaces. Incidentally, and as a possible solution to your problem, we might direct attention to the fact that many castings are produced satisfactorily in open sand molds.

## Encounters Difficulty in Arms Of Large Drum Cracking

We are enclosing blueprint of a spool-shape gray iron casting 3 feet 10 inches outside diameter and 2 feet 3½ inches high. Some of the arms crack at the junction with the rim. Later, when the castings are normalized and the outside face flame hardened, small checks or cracks develop on the lower shoulder. The cupola mixture contains 41.66 per cent pig iron, 33.34 per cent cast iron scrap and 25 per cent steel to produce castings of the following analysis: Silicon 1.63 per cent, sulphur 0.079 per cent; phosphorus 0.448 per cent, manganese 0.62 per cent, graphitic carbon 3.14 per cent, combined carbon 0.22 per cent.

Principal cause of the arm cracks is the difference in cooling time between the light outside rim and the heavy central hub. Contributing factors include a hard iron, rigid cores and the fact that the casting probably is gated on top of the hub. Possibly, digging out the center core immediately after the metal has set, may prove a sufficient preventive. Otherwise it may be necessary to raise the silicon content in the iron about 20 points and to gate the casting at several points on the rim, or through a ring of pop gates, one on top of each rib near the outside extremity. The cores should be as nearly collapsible as possible, with a minimum amount of binder and rods and with the inside filled with coke and plain black sand.

The same causes, hard iron and hard cores are responsible for the checking on the outside shoulder. Through prevention of normal contraction, the skin of the casting is in a mild state of tension. The normalizing and flame hardening process relieves this tension by opening a number of small cracks. Alternate heating and cooling will crack any iron. Special irons will withstand severe treatment of this kind. Low sulphur, low phosphorus irons expand and contract more readily than irons with a larger content of these elements. Outstanding examples in this class are ingot molds made from bessemer iron. Chilling the outside of the casting might be a more acceptable method than flame hardening. A number of light chills could be incorporated in the sectional cores forming the outside of the mold.

## Insufficient Bed in the Cupola Causes Trouble With Drop

We are experiencing trouble with our cupola drop at the end of the heat in that it is impossible to get it clean. Conditions relative to lining diameter, amount of air, weight of coke, etc. are the same as previously. We have tried increasing the coke without result. We reduce the amount of air near the end of the heat. There is one thing we notice, and that is the last charge of metal does not melt up completely, and we generally have quite a bit of iron from the last charge in the drop. That was the reason for adding more coke to the charges.

The fact that you find metal which is not melted when you drop the bottom of your cupola indicates that your bed has burned considerably below the tuyere level during the heat. Addition of coke to the splits sometimes aids in overcoming that trouble, but evidently in your case the amount added was not sufficient. However, using a bed that is too low, and trying to maintain proper melting conditions by employing more coke between the charges is dangerous practice besides costing more money.

The trouble with that practice is that you never know the location of the bed in relation to its proper position, and hence, cannot determine whether or not the increased amount of coke between charges is sufficient to bring the bed to its normal point. In your case it appears that the coke added was insufficient. You probably are running a short heat of 1 to 1½ hours so that the decrease of the

bed is not so apparent but if the time were extended you probably would get to the point where the iron hardly could be poured due to sluggishness.

We believe that an increase in the amount of coke in the bed will eliminate your trouble. You do not state the height of the bed above the top of the tuyeres, but it should be at least 30 inches, and preferably 36 inches. In some cases the height may be 48 to 60 inches, particularly with high steel scrap charges. One way to get an idea of the minimum coke height above the tuyeres is to examine the lining after the heat, and determine the lower limit of the melting zone. Add 6 to 8 inches to that measurement as the amount of coke required to melt the first charge of iron.

Another method is to watch through the peephole in the tuyeres for the appearance of the first drops of iron. They should show up in about 4 minutes. If it takes much longer the bed is too high, and if the iron appears sooner, the bed is too low. Both preceding lures mentioned are only rule-of-thumb guides, and should not be taken too literally. The real criterion is to get the iron sufficiently hot on the first tap, and maintain that condition during the whole heat—and that only can be determined by experimenting with the height of bed, and the weight of iron in the charges.

## Numerous Factors Influence Appearance of Castings

We are making solid and cored bushings in cast iron molds, and are having difficulty in that the outside surfaces sometimes are pitted or have indentations that are smooth and hard looking as though glazed. We have tried pouring at different rates and temperatures without results. We believe that the trouble is due to lack of a suitable mold coating. We have tried graphite and oil but neither gave as good results as an uncoated mold. The alloy used is a hard phosphor bronze containing 13 per cent tin and 0.75 per cent phosphorus. Bars and bushings are 2 to 3 inches outside diameter and 10 to 16 inches long; solid, light and heavy wall. Molds are cast iron split and clamped. Pouring is directly into the mold through a 2½-inch high funnel which forms a riser full diameter of the piece. On cored bushings, the core extends through the riser.

There are so many factors which influence the surface characteristics and structure of castings that it is difficult to control them all so that uniformly constant results can be assured. The metal itself has an important influence, and if it has absorbed gas during melting that will be thrown out of solution during solidification resulting in defective spots on the surface. With the higher phosphorus content in your alloy, dissolved gas may result in the formation of a hard combination of tin, phosphorus and copper which is forced out on the surface resulting in the glazed spots you mention. Foundrymen usually refer to that phenomenon as "tin sweat".

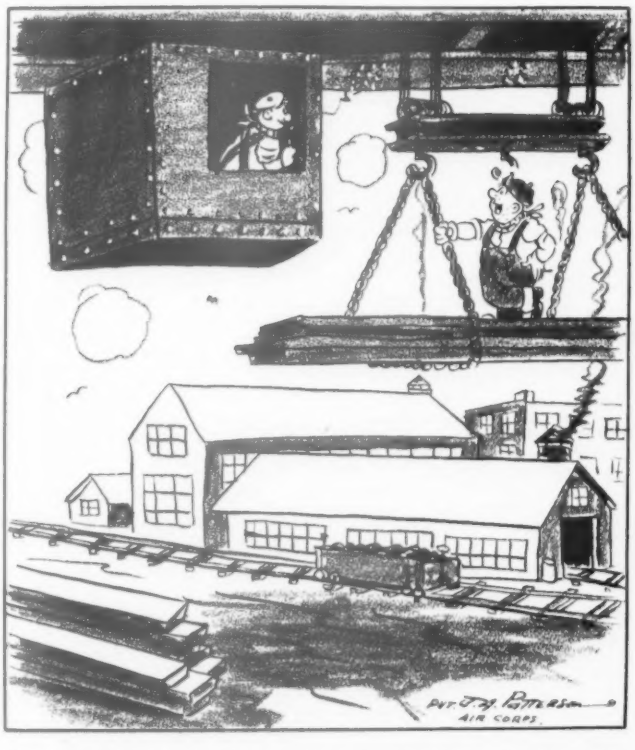
Surfacing of the mold with a coating of some kind will have a definite effect on the surface obtained on the casting. Some use a mixture of oil and graphite which is swabbed on while the mold is hot enough almost to cause burning. That only should be applied two or three times a week. The molds should be kept clean at all times. A mixture of lampblack and benzene sprayed or brushed on a hot mold also has been found helpful. Another procedure is to smoke the mold surface with an oil or acetylene flame burning with insufficient oxygen to produce an exceedingly smoky flame. Those flames produce a smudge of finely divided carbon which is deposited on the mold face. Smoking should only be done often enough to replace the coating as it is washed or burned off by the molten metal. If the mold is smoked too often, the coating becomes thick, and will flake off. The flakes may be carried into the casting or leave a patchy surface.

Another type of mold coating is comprised of chalk, whiting, clay or soapstone mixed with water to form a thin paint. Generally those are used where it is desired to obtain an insulating coating between mold and casting. An important feature of permanent mold casting is to obtain the proper ratio between thickness of casting and thickness of mold so that the desired structure is obtained in the casting. Hence, a mold that will produce a satisfactory solid casting may not operate to the best advantage for a cored piece. Pouring temperature, and mold operating temperature also must be controlled within reasonable limits to obtain satisfactory results.

Gating of the mold will have an influence. Pouring through the top as you do will serve in many cases, but in others bottom pouring may be required. One method whereby good cored bushings have been cast is to pour through the core which is made hollow for that purpose with openings at the bottom. That permits the metal to rise quietly around the core and fill the shrink head above the mold. Such procedure introduces a problem of sufficient venting of the core to insure that the gases are carried away. An exceptionally comprehensive and detailed paper by Henri Marius on the subject of chill cast bronze bushings and railroad rolling stock bearings was published in the Aug. 1, 1929 issued of THE FOUNDRY.

## GANGWAY!

By Pvt. J. A. Patterson




**"Yeah, he's right at th' dangerous age—always fallin' out of his high chair and stuff like that."**

## Put Concrete Floor In the Foundry

We are considering the advisability of putting cement floors in our foundry. We have been informed that a certain amount of borings or turnings mixed with the cement will prevent the material from exploding or chipping when molten iron falls on it. If this report is correct can you tell us the proper amount of borings to incorporate in the mixture?

Concrete floors have been put down in many foundries and have given satisfactory service. The many advantages are obvious, including a level surface for the molds, ease of truck manipulation, sand is cut more readily either by hand or machine, the floors can be kept in more presentable condition. The only objection, and this objection applies to any type of artificial floor, is that it will not resist molten iron. However, this is a minor factor, since in the majority of cases close supervision will prevent indiscriminate spilling of iron.

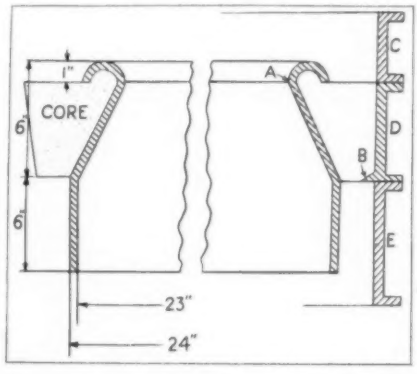
Molds occasionally run out or spill iron from an accidental cause, but that is one foundry hazard regarded as inevitable and one for which up to the present no positive remedy has been discovered. In some places a precautionary film of sand approximately ½-inch thick is spread on the floor before pouring commences. This prevents any spilled iron from coming into direct contact with the concrete. A comparatively recent innovation in concrete floors, particularly gangways, is the incorporation of cast iron gratings flush with the surface. Where borings or turnings are added to the mixture, the amount usually is 10 per cent.

## Eliminate Use of a Dry Sand Core

We are enclosing sketch of a gray iron ring casting, 24 inches diameter at the bottom, 17 inches diameter at the top, ½-inch metal thickness. We use a large dry sand ring core to form the outside of the upper part and the bead under the shoulder. Can we use a chill in place of this core? Can we employ concrete cores which will be cheaper to make and which can be used repeatedly?

The present method shown at the left in the accompanying illustration presents certain advantages where no special flasks are available and where the number of castings is not large. The cores cannot be replaced by chills for several reasons. The first and principal reason is that the chills will not hold their shape. The chill must be cast in several sections to facilitate removal from the casting. Each time the mold is filled with molten iron the chill expands more on the inside than on the outside. The result is that after a few contacts the section *spreads* and the combination no longer forms a true circle. You are mistaken in your belief that concrete cores can be used more than once. We assume that you are referring to sand cores bonded with cement. They disintegrate as readily as cores bonded with any other material.

The mold readily can be made entirely in green sand in a three part flask as shown to the right of the illustration. The pattern is in two parts joined by suitable dowel pins or male and female joint at the neck line *A*. The cheek or center flask part is provided with an internal flange *B* to carry the sand. In the event the molds are rammed by hand the pattern is bedded to the required depth in the drag. Sand is rammed to the neck parting line on the inside and to the cheek parting line on




*Present method with dry sand core shown at left. Proposed method all green sand in three part flask shown at right*

the outside. The cheek flask then is set in place and sand is rammed to the upper parting line, and tucked with the fingers up under the curved overhang. The cope then is rammed in the usual manner and removed. The cheek is lifted off, the pattern is drawn and the mold is reassembled. On a production basis three separate patterns would be employed, one for the drag, one for cheek and one for the cope.

## Lining Burns Away On Short Heats

We are running two heats per week in a 27-inch diameter cupola, sometimes three but usually two charges of 600 pounds each. The lining burns away to such an extent that we have to reline the melting zone about every three months. Quite a bridge hangs over the tuyeres after every heat. Is there any advantage in mixing salt with the daubing? Should we use limestone between the charges? We have no volume of pressure gage. Would a pressure gage give a fair idea of volume? What is the correct volume for a 27-inch cupola? Apparently our present volume is not sufficient since the heat takes nearly an hour. The cupola is equipped with four tuyeres 3 x 10 inches.

With the light heats you are running twice a week the cupola lining should last almost indefinitely. Our first guess would be that your daubing material is no good if it will not stand up to a heat of less than an hour's duration. We suggest you experiment with other materials for example, a good fireclay mixed with enough sharp sand to keep it from cracking. Another mixture is made up of half and half old molding sand and pulverized fire brick bonded with fire clay in the proportion of 1 part fireclay to 4 parts sand and brick. A sand mixer with rollers is necessary to prepare the material properly. Some cupola men add a little salt to the daubing material, but the resulting glaze would be of little or no value in your case.

The quality of your coke may be a retarding influence on the speed of melting. Coke with a high ash content will not melt iron as rapidly as coke of a better grade. Also it will produce more slag and will facilitate the formation of a bridge over the tuyeres. If, as seems probable the air supply is not sufficient, you can secure better melting conditions by reducing the size of the charges. Small, thin charges of coke and iron will move steadily through the cupola, where thick, heavy charges remain in one position too long with the consequent opportunity for the slag to form a bridge. Limestone is not an actual necessity on a short heat, but you might find it advantageous in helping to keep the cupola clean. A pressure gage is of no particular value by itself. Volume is the really important factor. With other conditions properly balanced, a 27-inch diameter cupola requires approximately 1200 cubic feet of air per minute.

## Bottom Coming Up Causes Trouble

We encountered some slag trouble on 9000-pound basic steel heat. The heat was practically ready but not quite hot enough for tapping. The temperature was about 1400 degrees Fahr. carrying a very strong carbide slag. To reach a temperature of about 2000 Fahr., which is the tapping temperature of our bottom pouring heats, we increased the phase load on a low voltage. The slag reverted itself, giving it a white surface and black center. The temperature then dropped to 1000 degrees. From then on we could not get the metal any hotter. We tried going to high voltage but with no effect except that the slag became very fluid. We could not revert any slag back to its right consistency. It took practically 45 minutes to get the metal near tapping temperature, when it should have taken about 5 minutes. When the heat was in the ladle the slag was very heavy but it still had that reversed color. Could you tell us what caused the drop in temperature and how we could have gotten the metal hot enough and still maintained the carbide slag?

From your description, we are assuming that what is meant is that the slag became white on the outside and dark on the inside, in the layers that stuck to the test spoon or stirring rod when the steel was stirred up. Possibly also a slag test was poured out on a

(*Concluded on page* 108)

# ON THE MARCH
## to aid Foundrymen...

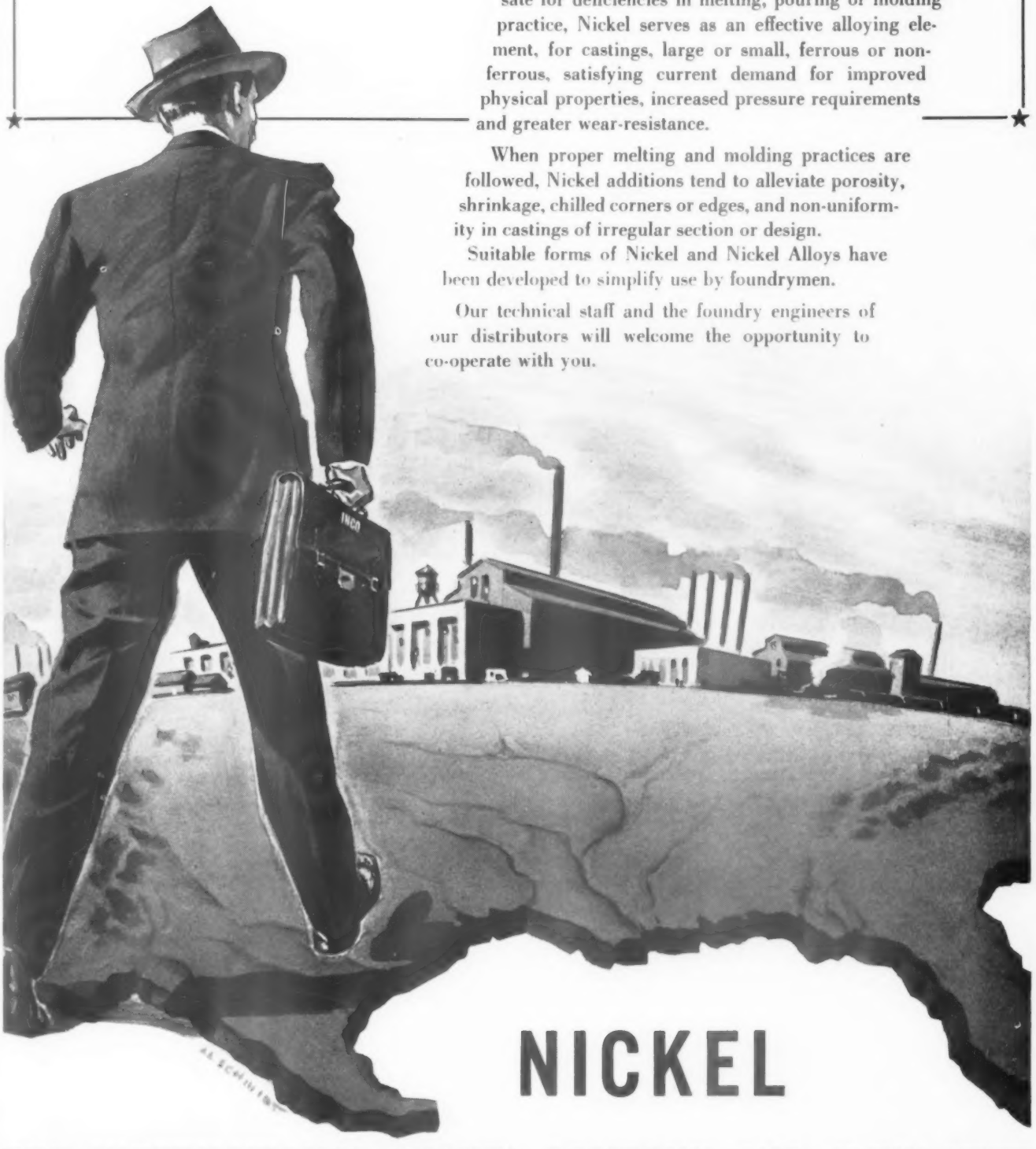
**NICKEL FIELD REPRESENTATIVES** are always "on the go." By reason of training and experience they are equipped to offer timely assistance on foundry problems.

While not a "cure-all" in that it will not compensate for deficiencies in melting, pouring or molding practice, Nickel serves as an effective alloying element, for castings, large or small, ferrous or non-ferrous, satisfying current demand for improved physical properties, increased pressure requirements and greater wear-resistance.

When proper melting and molding practices are followed, Nickel additions tend to alleviate porosity, shrinkage, chilled corners or edges, and non-uniformity in castings of irregular section or design.

Suitable forms of Nickel and Nickel Alloys have been developed to simplify use by foundrymen.

Our technical staff and the foundry engineers of our distributors will welcome the opportunity to co-operate with you.




# NICKEL

**THE INTERNATIONAL NICKEL COMPANY, INC.** 67 WALL STREET NEW YORK, N. Y.

(*Concluded from page* 106)

plate or in a mold, and showed the same color on the fracture.

The temperatures given are incorrect, and it would be interesting to learn how they were determined. The highest temperature mentioned, 2000 degrees Fahr., is said to be the correct tapping temperature for the steel. Many steel castings are annealed at 2000 degrees, which is greatly below the melting point of steel. The 1000 degrees Fahr., mentioned as the temperature to which the steel fell, is only orange heat, hardly that, really red. We suggest that you check up on your temperature determinations.

We think that what happened was that the bottom came up and a large percentage of magnesia went into the slag, in addition to the lime (CaO) intentionally present. Sometimes a patch in the bottom not properly set comes up, and occasionally a piece of the bottom naturally softens and rises. When this happens, the high-magnesia slag formed is extremely difficult to handle, the slag grows very heavy and it is hard to heat the steel properly. Color of the slag corresponds to the description you give.

Sometimes when this happens before the heat is hot, the situation can be improved by removing the bad slag, and making a new one. This loses time, but not always as much time as would be lost if the poor slag were kept in the furnace. When the heat is nearly ready, and the bottom comes up, the only thing to do is to worry along, put on more current, and get the steel hot as best one can. Time will be lost in getting the steel hot, and more time will be spent in setting a proper patch, but there is no help for it.

## Metal Burns on to The Mold Face

On certain 85-5-5-5 bronze castings with section 8 x 8 inches, made in No. 2 green sand molds, the metal burns on to the face of the mold, although the face has been rubbed with graphite.

A grade of sand conforming approximately to No. 2 Albany generally is found satisfactory for bulky bronze castings. The usual facing is half and half new and old sand moistened with molasses water. The surface of the mold is covered with graphite, preferably rubbed on by hand. In extreme cases it may be necessary to apply the graphite as a wash mixed with molasses water or any other soluble core binder. Several proprietory refractory materials also are available. The mold then is either dried or merely skin dried. Any one of several factors may be responsible for the burned or rough surface. The metal may be poured hotter than necessary.

On a heavy section casting the pouring temperature of this red metal need not exceed 2000 degrees Fahr. The sand in places may not be rammed firmly and uniformly. On the softer areas the metal will gouge in. In another place the sand may be rammed too hard or too wet and not properly vented. The generated steam may force some of the surface sand out of place. In corners, pockets and in places where bodies of sand are more or less surrounded by molten metal, provision must be made for the rapid escape of steam and gas. The gating system may be a contributory factor. Where a large amount of metal rushes past any given area, the sand may disintegrate through the combined action of heat and erosion. Wherever possible the metal should be introduced as gently as possible through two or more gates. In this manner the effect of erosion is minimized.

## Changes Gating To Insure Feeding

We are making some manganese bronze washers 28½ inches outside, 20 inches inside diameter, ½-inch thick. They weigh 47 pounds. We are pouring them two-up at a temperature between 1700 and 1800 degrees Fahr. with 4 risers set equidistant around the outside. The risers are 2½ inches in diameter and 5 inches high in the cope. The castings are in the drag. When the castings are machined, spots which we believe are dross show up on the surface right in front of the gates.

The trouble with your castings is not due to dross but to lack of feed. As you undoubtedly know a flat plate is one of the hardest castings to feed, due to the difficulty in obtaining directional solidification. Consequently, a careful consideration must be given to gating and risering. One successful method is to cast such work on edge, but sometimes that cannot be done easily or without additional cost. They can be cast flat by using a tilting mold, and we suggest the following procedure.

Use a deeper cope, or extend the gate and riser height through use of a bushing so that they are 7 or 8 inches high. Use one riser, place it close to the casting and increase its diameter to 3½ inches. The sprue is placed to one side of the riser and connected to it by a runner. When the mold is ready to be set on the floor, a piece of wood is placed under the center to act as a fulcrum, and another block is put under the end opposite the riser so that the mold rests on angle with the riser and gate at the low side. The mold is poured, and as soon as it is filled, the block under the end is kicked out which permits the mold to tilt in the opposite direction. When it reaches that position the riser is on the high side which increases its feeding pressure.

If necessary additional hot metal can be poured into the riser for feeding purposes. You can see that use of a tilting mold in addition to giving higher feeding pressure also permits pouring the metal uphill so that it enters the mold in a solid, unbroken flow. In addition we believe that you will find that the use of a single riser, although larger, will weigh less than those you now are using, the cost of removal will be lower and you will not have to melt as much metal. Do not be discouraged if the first casting made is not successful as there may be some minor points to be corrected. However, we believe that you will find after some experience that the tilting mold procedure has definite advantages for certain types of castings.

## Offers Suggestions On Procedures

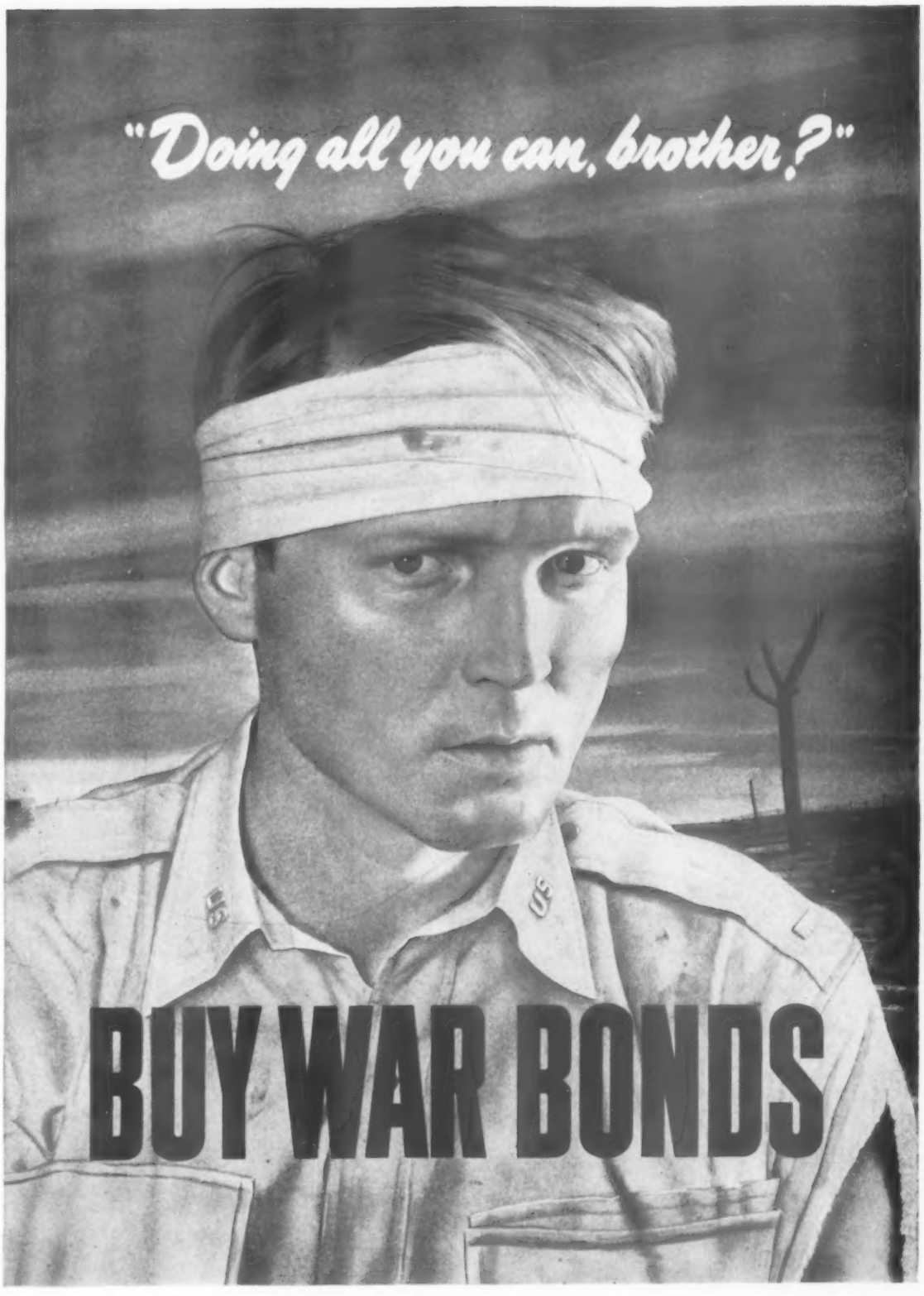
We have an order to make some fittings from the 82-12-5-1 alloy, and understand that we might have some difficulty with them. The parts include a valve wheel handle with a heavy hub connected to the rim with a thin web, a hollow cap with a hexagonal portion above a heavy central flange, and a hexagonal plug. Can you give us any suggestions to avoid possible trouble.

The composition 82-12-5-1 is one that should not give much trouble if care is taken in melting to prevent gassing and gating is such as to provide quiet flow with adequate force into the mold cavity. The alloy mentioned does have a tendency to shrink, and provision must be made for risers or shrink balls to feed the castings. From time to time the composition of the metal should be checked to see that the zinc content is maintained within the desired limits.

The castings you mention are not particularly troublesome in design except that the heavy sections will require feeding. The valve wheel has a sufficiently large hub to necessitate a riser over it since there is no way to feed it through the thin web. The hexagonal plug will require feeding. One method of making those is to split the pattern so that the mold joint is located at the corners of the hex. That places the heavy section in a horizontal rather than a vertical plane, and a heavy gate with one big riser could be located to feed several castings arranged around it.

The hollow plug with the flange should be gated into the flange through a heavy gate with a shrink ball close to the casting to insure feeding. One thing strongly recommended before adopting a standard method of gating is to make a few experimental castings with different gating systems. Fracture and machine the sections of these to determine which gives the best castings. Then adopt that system, and standardize melting practice, sand condition, and other practices on that basis.

Watch your metal and be sure that the furnace atmosphere is slightly oxidizing to prevent gas absorption by the metal. Melt as rapidly as possible. Do not keep the metal in the furnace any longer than is absolutely necessary to have it reach the desired pouring temperature. For the relatively heavy section castings you will make, the pouring temperature does not have to be excessively high. Pour the metal as soon as it is ready, but be sure to skim it thoroughly. It is much better to have molds waiting for metal than to have metal waiting for molds.

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# MEN ...of Industry

**FRANK S. O'NEIL,** formerly general manager, Indianapolis plant, Link-Belt Co., has been made vice president. **James S. Watson,** vice prresident, Indianapolis, who has completed 50 years of service, plans to retire at the end of the year. He continues as a director of the company. Mr. O'Neil joined the Link-Belt organization at the company's Pershing Road plant, Chicago, where he worked in the foundry, machine shop, cost department, rate setting and production departments. He was transferred to the Indianapolis plant in 1916. In Indianapolis he has served successively as assistant superintendent in charge of malleable iron chain assembly, superintendent of the Ewart plant, assistant general manager of both Ewart and Dodge plants, and as general manager since 1939.

♦ ♦ ♦

**John Hill,** president, Hill & Griffith Co., Cincinnati, will celebrate his eightieth birthday on May 13. At that time he will have completed 66 years of work and association with the foundry industry. Mr. Hill was born May 13, 1863 in Dalton, Ga. His father, Robert Hill, owned and operated the Dalton Foundry & Machine Co., and, as was the custom in those days, young John at the age of 12 began helping in the foundry. He completed his education at Dalton, and when he was 17 went to Louisville, where he gained experience working in the Ainsley & Cochran Foundry Co. He was 19 when he went to work for the railroads, but the lure of the foundry was too much to resist, and around his twenty-first birthday he began his road travels selling foundry facing and supplies. Mr. Hill formed his own company, the Hill & Griffith Co., after 13 years of traveling throughout the entire United States. He was an early member of the American Foundrymen's Association, joining that organization in 1897.

♦ ♦ ♦

**Claude J. Neville,** formerly vice president and works manager, has been named vice president and treasurer, C. O. Bartlett & Snow Co., Cleveland. Mr. Neville joined the Bartlett & Snow company in an engineering capacity in 1906, became superintendent in 1920, works manager in 1925, was elected a director in 1933 and has served as vice president since 1941.

♦ ♦ ♦

**Henry A. Christy,** formerly superintendent, has been named works manager, C. O. Bartlett & Snow Co., Cleveland, succeeding **C. J. Neville,** now vice president and treasurer. Mr. Christy joined Bartlett & Snow as production clerk in 1923, a few days after graduating from Case School of Applied Science. He has progressed steadily in the company, having been made assistant production manager in 1925, production manager in 1928 and superintendent in 1936. He was elected to the board of directors in 1942.

♦ ♦ ♦

**J. R. Wark,** recently commissioned a lieutenant junior grade in the United States Naval Reserve, has not resigned his connection with the Queen City Sand & Supply Co., Buffalo, as was mentioned in the April issue of THE FOUNDRY. Jack has been given a leave of absence and will return to the Queen City company following the war. Ralph Turner is carrying on for Jack, while he is away. THE FOUNDRY regrets this error.

♦ ♦ ♦

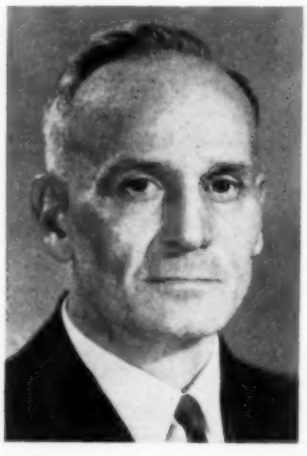
**George M. Hayes,** formerly an instructor in foundry practice under vocational training, Alabama Polytechnic Institute, Auburn, Ala., has joined the metallurgical department, Thomas Foundries Inc., Birmingham, Ala. Mr. Hayes received technical and mechanical training at St. Aloysius High School, St. Bernard College and Alabama Polytechnic Institute. Before going to Auburn, he was connected with the melting department, Stockham Pipe Fittings Co., Birmingham, Ala. Prior to that he was chemist at Central Foundry Co., Holt, Ala., for several years. Over a period of 20 years he has had experience in all departments of the foundry industry. Mr. Hayes is a member of the American Foundrymen's Association.

♦ ♦ ♦

**George Johnstone Jr.** has been promoted to the position of foundry superintendent, Cooper - Bessemer Corp., Grove City, Pa. Mr. Johnstone was graduated from Temple University Evening School of Metallurgy and took additional work in the same subject at Carnegie Institute of Technology. His career in the foundry industry began at the Cochrane Corp., Philadelphia, where he served two years of a molder's ap-

(*Continued on page* 112)

*John Hill*



*Claude J. Neville*

*Henry A. Christy*

*Frank S. O'Neil*

**WOODWARD IRON COMPANY**

**WOODWARD, ALABAMA**

*America's Largest Completely Integrated and Entirely Independent Merchant Iron Producer*

(*Continued from page* 110)
prenticeship, leaving there to finish the apprenticeship with Westinghouse Electric & Mfg. Co. in its foundry at Lester, Philadelphia. Succeeding positions were with Cramp Brass & Iron Foundries, Eddystone, Pa., and Barry Bronze Bearing Co., Camden, N. J. In 1934 he became connected with Alan Wood Steel Co., as assistant foundry foreman, leaving there to become foundry foreman with Lewis Foundry & Machine Division, Blaw-Knox Co., Coraopolis, Pa., in 1938. Mr. Johnstone taught foundry practice at Girard College, Philadelphia, for one semester, after which he became foundry superintendent, William A. Hardy & Sons Co., Fitchburg, Mass., which position he held until joining the Cooper-Bessemer company in June, 1942.

♦ ♦ ♦

**Robert H. Morse Jr.** has been appointed general sales manager, Fairbanks, Morse & Co., Chicago. Mr. Morse joined the company in 1916 and his experience includes 10 years in the manufacturing divisions followed by sales experience as manager of various company offices throughout the United States.

♦ ♦ ♦

**Norman F. Smith,** vice president and general manager, Osborn Mfg. Co., Cleveland, was elected president, American Brush Manufacturers Association at its annual convention held at Rye, N. Y. recently. Mr. Smith is one of three sons of Franklin G. Smith, president of the Osborn company. A graduate of Dartmouth College in 1925, he has been associated with the Osborn organization for the past 18 years.

♦ ♦ ♦

**C. E. Bales,** vice president, Ironton Fire Brick Co., Ironton, O., was elected president, American Ceramic Society at its forty-fifth annual meeting held in Pittsburgh, April 19. Mr. Bales served as president of the Ohio Ceramic Industries Association during the past 2 years, and is a director of the American Refractories Institute. He also is active in the American Foundrymen's Association, American Institute of Mining and Metallurgical Engineers, American Society for Testing Materials, the Mineralogical Society of America, and the Rocks and Minerals Association.

♦ ♦ ♦

**George K. Manning,** metallurgist, has become connected with the research staff, Battelle Memorial Institute, Columbus, O., and has been assigned to its division of metallurgical research. Mr. Manning previously was assistant director, metallurgical laboratory of the Chicago plant, Republic Steel Corp. He is a graduate of Franklin College, Franklin, Ind., and holds a master of science degree in metallurgical engineering from the University of Michigan. At the university he was a graduate assistant in the engineering research department.

♦ ♦ ♦

**R. J. Rowen** has been appointed manager, Wheeling, W. Va. district of the Air Reduction Sales Co., New York.

♦ ♦ ♦

**Hugh A. Brightwell** has been appointed sales and service representative for Manning, Maxwell & Moore Inc., Bridgeport, Conn., in the Tulsa, Okla. district.

♦ ♦ ♦

**Keith Morey,** for the past 2 years chief of plant protection, Buda Co., Harvey, Ill., has been appointed director of safety, in addition to his former duties.

♦ ♦ ♦

**Wayne P. Eddy,** former president, Production Planning Co., Detroit, has been appointed production manager, Dodge-Chicago Division, Chrysler Corp., Chicago.

♦ ♦ ♦

**J. J. Jordan** has been appointed director of customer relations, True Alloys Inc., Detroit. Mr. Jordan formerly was connected with the sales division of Federal-Mogul Corp.

♦ ♦ ♦

**Frederick Salditt,** vice president in charge of sales, Harnischfeger Corp., Milwaukee, has been elected a member of the board to fill the vacancy created by the death of Joseph H. Harnischfeger. Mr. Salditt has been associated with the company since 1923 when he joined the manufacturing division as an engineer. Other new appointments include: **H. H. Erkelenz,** executive engineer, has been elected vice president in charge of engineering; **Herman Menck,** works manager, has been appointed vice president in charge of manufacturing; **W. F. Heilman** was elected secretary; and **F. J. Hartmann** was appointed to the post of assistant secretary and assistant treasurer.

♦ ♦ ♦

**George R. Atkins** has been named manager of the branch sales office and factory, Akron, O. for the Bristol Co., Waterbury, Conn.

♦ ♦ ♦

**Edward B. Morrow** has been elected vice president, Hercules Powder Co., Wilmington, Del. **Francis J. Kemerley** has been appointed to succeed Mr. Morrow as treasurer of the company.

♦ ♦ ♦

**E. C. Bullard,** vice president and general manager, Bullard Co., Bridgeport, Conn., marked his twenty-fifth year with the firm on March 18. He was guest of the Bullard Foremen's Club, at a dinner attended by 200 members and friends.

♦ ♦ ♦

**W. B. McCarthy Jr.** has been appointed production engineer for the Warman Steel Casting Co., Los Angeles. Other appointments made recently include: **E. B. Westall,** plant metallurgist; **W. C. Burger,** sales manager; **M. W. Cardwell,** comptroller.

♦ ♦ ♦

**Frederick V. Geier,** president, Cincinnati Milling Machine Co., Cincinnati, has been named chairman of the local committee on organization for the Committee for Economic Development, a national industrial group engaged on plans for postwar employment.

♦ ♦ ♦

**Harry C. Wanner,** for 20 years president of Wanner Malleable Castings Co., Hammond, Ind., and recently head, Steel and Iron Casting Division, Chi-

(*Concluded on page* 114)

*C. E. Bales*

*Norman F. Smith*

*Robert H. Morse Jr.*

*George K. Manning*

# 3 BOOSTERS for Truline Binder

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**"FASTER CLEAN-UP . . ."** Another advantage of Truline is that as soon as core temperatures reach 650° it burns out, allowing the core to collapse without hindering shrinkage of the metal. Thus the core-sand shakes out easily and valuable clean-up time is saved. Furthermore, since core collapses as the casting itself begins to shrink, hot-tears and similar defects are kept at a minimum.

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(*Concluded from page* 112)

cago office of the Office of Price Administration, has become president and taken over active management of the Headford Bros. & Hitchins Foundry Co., Waterloo, Iowa. **O. E. J. Abrahamson** has been appointed vice president and superintendent. Mr. Abrahamson has served as an official of the American Radiator Co. in Buffalo and Detroit, and spent the past seven years in Sweden as head of a large foundry there.

♦ ♦ ♦

**Leroy L. Wyman,** metallurgist for approximately 19 years with the Research Laboratory, General Electric Co., Schenectady, N. Y., has been released for the emergency to join the staff of the War Metallurgy committee, National Academy of Sciences, National Research Council, to serve as research supervisor.

♦ ♦ ♦

**William W. Klemme** has been appointed district manager of industrial sales in Dallas, Tex., for Chain Belt Co., Milwaukee. Mr. Klemme previously was district manager at Buffalo, and has been connected with the company since 1935. He is a mechanical engineering graduate of the University of Wisconsin.

♦ ♦ ♦

**Thomas C. Finnell** has been appointed manager of the industrial department, eastern district, Westinghouse Electric & Mfg. Co., succeeding **C. W. Miller** who has been named manager, application department, Westinghouse Radio Division, Baltimore. Mr. Finnell joined the Westinghouse company in 1929.

♦ ♦ ♦

**J. J. McIntosh** has been appointed Southwestern representative for Greene, Tweed & Co., New York, his territory including Alabama, Florida, Georgia, Mississippi, North Carolina, South Carolina, and Tennessee east of the Tennessee river. **B. F. Coombs** has been appointed Texas sales representative of the company.

♦ ♦ ♦

**Frank J. DeRewal,** formerly research chemist, Foote Mineral Co., Philadelphia, has been appointed to the research staff of Battelle Memorial Institute, Columbus, O., and has been assigned to its division of nonferrous metallurgy. Mr. DeRewal is a graduate of the Philadelphia College of Pharmacy and Science, and has done graduate work at Harvard and Syracuse universities.

♦ ♦ ♦

**N. R. Knox,** since 1933 vice president, has been elected president, Bucyrus-Erie Co., Milwaukee. W. W. Coleman, president of the company for the past 32 years, retains chairmanship of the board which he held in addition to the presidency. **George A. Morison** has been advanced from vice president to vice chairman of the board; **W. L. Litle,** works manager of the company's Erie, Pa., plant has been elected vice president; **W. M. Bager,** formerly a vice president, has been appointed technical director. **N. A. McGrath** continues as secretary and **J. G. Miller** as treasurer.

Mr. Knox has been connected with Bucyrus-Erie since 1920 when he went to work in the foundry cleaning room immediately after graduating from Harvard. Successive positions which he held included: assistant to the foundry superintendent, foundry superintendent, general superintendent, works manager, assistant to the vice president, and vice president.

♦ ♦ ♦

**J. K. Mahaffey** has been appointed representative in the Pittsburgh territory for the Baker-Raulang Co., Cleveland. Mr. Mahaffey will be associated with **George H. Criss,** who has been representing the company in that territory. For the past 26 years Mr. Mahaffey was Pittsburgh district manager for Edison Storage Battery Division of Thomas A. Edison Inc.

♦ ♦ ♦

**Nathaniel C. Fick,** formerly metallurgist, Gary, Ind. works, Carnegie-Illinois Steel Corp., has been appointed to the research staff, Battelle Memorial Institute, Columbus, O., and has been assigned to the division of metallurgical research. Mr. Fick also served as a war training instructor at Purdue University. He holds a bachelor of science degree in chemistry from Butler University, and a master of science degree in metallurgy and metallography from Purdue.

♦ ♦ ♦

**Walter Geist,** president, Allis-Chalmers Mfg. Co., Milwaukee, has been appointed chairman, postwar planning committee for Milwaukee county, Milwaukee Association of Commerce. Other men of the foundry and foundry equipment industries who have been asked to serve on the committee include: **Robert H. Friend,** Nordberg Mfg. Co.; **William J. Grede,** Grede Foundries Inc.; **G. Kenneth Viall,** Chain Belt Co.; **Carl J. Zaiser,** Ampco Metal Inc.

♦ ♦ ♦

**J. R. Turner,** Queen City Sand & Supply Co., Buffalo, recently was made acting secretary of the Western New York Chapter of the A.F.A., succeeding John R. Wark who has been commissioned in the Naval Reserve. Mr. Turner was born in Peterborough, Canada, and was educated in the Peterborough and Toronto schools. At present he is completing 20 years in the service of the foundry supply industry. He joined the Queen City Sand & Supply Co. as assistant to Henry Rice on April 1, 1923 and in 1936, when Mr. Rice retired, he purchased his interest in the company. He was elected a director of the Western New York Chapter of the A.F.A. in 1941, and is a member of the Buffalo Chapter of the A.S.M.

♦ ♦ ♦

**John L. Carter** has resigned as special consultant on gray iron and malleable iron foundry industries, Office of Price Administration, Washington, to return to his former business as foundry cost consultant at Newark, N. J. Arrangements have been made with the Gray Iron Founders Society whereby Mr. Carter will direct and conduct its cost program described on page 171 of this issue. Since 1916, when he entered the foundry industry as manager Barlow Foundry, Newark, Mr. Carter's principal interest has been cost accounting. He served as chairman of the cost committee, Gray Iron Institute, for several years and was cost advisor to the National Code Authority of the gray iron foundry industry. Mr. Carter joined OPA in January, 1942.

♦ ♦ ♦

**Joseph P. Kittredge,** for many years manager, steel castings plant, National Malleable & Steel Castings Co., Sharon, Pa., has been granted leave of absence and has become consultant with H. A. Brassert & Co., New York. Mr. Kittredge has had extensive experience in centrifugal casting as well as in general steel foundry practice. He will be active in developing Brassert's sponge iron production process.

♦ ♦ ♦

**Daniel Lewis** has relinquished active direction of the roll department, Continental Roll & Steel Foundry Co., East Chicago, Ind., but will continue with the company as a consultant. His duties have been assumed by **William E. Cadman** as manager of roll sales, and **Arthur E. Murton** as roll manager. Mr. Lewis has been associated with the Continental company since 1927 and has been active in the industry since his high school days when he worked in the laboratory of Lorain Steel Co., Lorain, O. Later he joined Algoma Steel Co., Sault Ste. Marie, Ont., Canada, serving as assistant superintendent of the bessemer department and subsequently as superintendent of the rolling mills. In 1910 he joined Seaman-Sleeth Co., Phoenix roll works, Pittsburgh, as manager of sales, later becoming plant superintendent. He was with Wheeling Mold & Foundry Co., in 1926 and then joined Hubbard Steel Foundry Co. which in 1930 was merged with Duquesne Steel Foundry Co. and Wheeling Mold & Foundry Co. to form the present Continental Roll & Steel Foundry Co.

## Becomes Member of 50-Year Club

L. N. Aller, secretary-treasurer of Taylor-Wharton Iron & Steel Co., High Bridge, N. J., recently was awarded the company's 50-year medal. This brought to 15 the number of men now living who have been employed by the company for 50 years or more, according to George R. Hanks, president.

Organized in 1917 on the occasion of Taylor-Wharton's 175th anniversary, the 50-year Club has had a total of 42 members. Of the 15 now living, 11 still are in the employ of the company while the other 4 have retired.

Mr. Aller started with the company as a timekeeper at $3 a week when he was 16 years old. Progressing through various departments, he became assistant treasurer and was made secretary and treasurer in 1930.

# "JOE, EVERY EXTRA CASTING WE TURN OUT IS AN IMPORTANT MEDAL, TOO!"

IT isn't the metal in the Medal of Honor that counts; it's what it stands for. Same way with castings--it isn't the metal out of which they are made, but what the finished product means to the war effort.

Every worker in industry can win his own "medal of honor" by doing his job just a little better than ever before. Every casting that you clean in record time, brings victory just a little nearer. Multiply the effort now being expended in your foundry by the other hundreds all over the country and the value of the "extra bit" becomes apparent.

Sterling Portable Grinding Wheels are made in the correct size and shapes to do a fast casting cleaning job. Try them!

Sterling Grinding Wheels are helping snap up production in many casting cleaning departments. Being built for the particular job, they cut down operator fatigue . . make it possible to turn out more and better results.

Ask today for more information on the "Wheels of Industry" they will help you win your production "medal of honor."

• STERLING ABRASIVES •

THE

STERLING GRINDING WHEEL DIVISION

OF THE CLEVELAND QUARRIES COMPANY

TIFFIN, OHIO

THE WHEELS OF INDUSTRY

# Among DETROIT Foundries

BY A. H. ALLEN
Detroit Editor,
The Foundry

INFLUENCE of high-octane gasoline on postwar design of automobile engines figures prominently in discussions concerning the type of motor cars that will be built after the current unpleasantness is history. Engine weight is a less important consideration to the automotive designer than it is to the aircraft builder, but it is safe to say that the former will be able to take advantage of the war-inspired developments in motor fuel to place in the automobile of the future a lighter but more efficient power plant.

Since weight is a vital factor in top performance of airplanes, particularly in military craft, the airplane engine is basically an aluminum alloy cylinder block and crankcase, into which are shrunk forged steel cylinders, with steel crankshaft and connecting rods, and either steel or aluminum pistons, and aluminum cylinder heads.

This is a type of construction which at the moment intrigues automotive engineers, but when they look at the cost—about $10 per horsepower—and compare it with the average cost of motor car engines in the past—about $1 or $1.25 per horsepower—they shake their heads sadly.

### Cost Is Too High

True, much of the aircraft engine cost results from the precision finish given all parts and from the time required for assembly, test teardown and reassembly. These are unnecessary details in building automobile engines, and while the basic type of construction is somewhat more costly than the conventional automotive unit, it could be reduced appreciably from the present level. In fact, there is a strong possibility that some bold experiments will be made in this field when the time is available.

Automobile engines now weigh 6 to 8 pounds per horsepower, and the engine constitutes 15 to 20 per cent of the car's weight. If the engine weight could be cut to, say, 3 pounds per horsepower and stay within the cost limits of automotive practice, the result would be a highly efficient engine with important possibilities. It would have a completely sealed cooling system, a high power-to-weight ratio, good economy, and above all it would be *modern*. That word means a lot, for essentially a motor car must be built to sell, and you can sell something which is new and different, something on which the industry's advertising experts can really capitalize.

The only trouble with such an innovation is that it would take time to design, develop, tool, test and finally build. It is unlikely such a process could be squeezed into much less than 18 months to 2 years' time.

But new engine developments are in the wind, make no mistake of that. They will not be the fantastic 50-pound engines, mounted on each wheel, which some of the crystal-gazers profess to see, but they *will* be a long step ahead of the best now available in the industry. Chief impetus behind their development will be the higher octane gasolines becoming available in steady increasing quantities. Theoretically, 100-octane gasoline is the maximum to be expected from refinery practice, but laboratory work has produced gasoline with a rating equivalent to even 300-octane, so the upper limits of fuel volatility and engine compression ratios have still to be explored on any kind of practical basis.

### To Use New Steels

One thing seems reasonably certain so far as engines are concerned, and that is in respect to the use of alloy steels such as the industry has come to know them—the 3.5 per cent nickel steels, the SAE 4340's and 2512's, the silicomanganese and the others. They are steels of the past and will certainly give way to the newer NE "lean alloy" steels and their progeny.

We shall see crankshafts, connecting rods, camshafts, gears—yes, even intake and exhaust valves—going to the low alloy steels, not as a conservation measure, but simply because these steels will more than meet requirements and will save money over the higher alloy types. Furthermore, by that time, all steels doubtless will be given the "needling" or "vitamin treatment" involving the addition of minute percentages of boron, in such form as grainal, silvaz, bortam, borosil or any one of a dozen other metallic compounds which will then be available at low cost to all steelmakers.

Look for a host of new developments in bearings—in the direction of different nonferrous materials such as silver, indium and some other rare metals—plus great reductions in the thickness heretofore thought necessary in bearings. The old type of babbitt bearing will gradually become a thing of the past in automobile engines.

Gray iron castings have comprised a large part of the total weight of the motor car engine, and because of their low cost, good vibration-absorbing properties and good performance under extremes of heat and cold, they will likely continue as an important basic material in future engines. But they will be better castings than they are today, possibly made to close limits on chemical specifications, physical properties and the like.

Suppose we draw up a few general specifications for our automobile engine of the not-too-distant future: A power plant weighing 25 per cent less than the present average, with 75 horsepower at 3600 r.p.m. but with high torque at low speeds; fuel economy of 20 miles per gallon; permanently sealed cooling system never requiring attention, winter or summer; oil change required only 20,000 miles; guaranteed starting at 100 degrees Fahr. or —10 degrees Fahr.; and cost not to exceed $1 per horsepower.

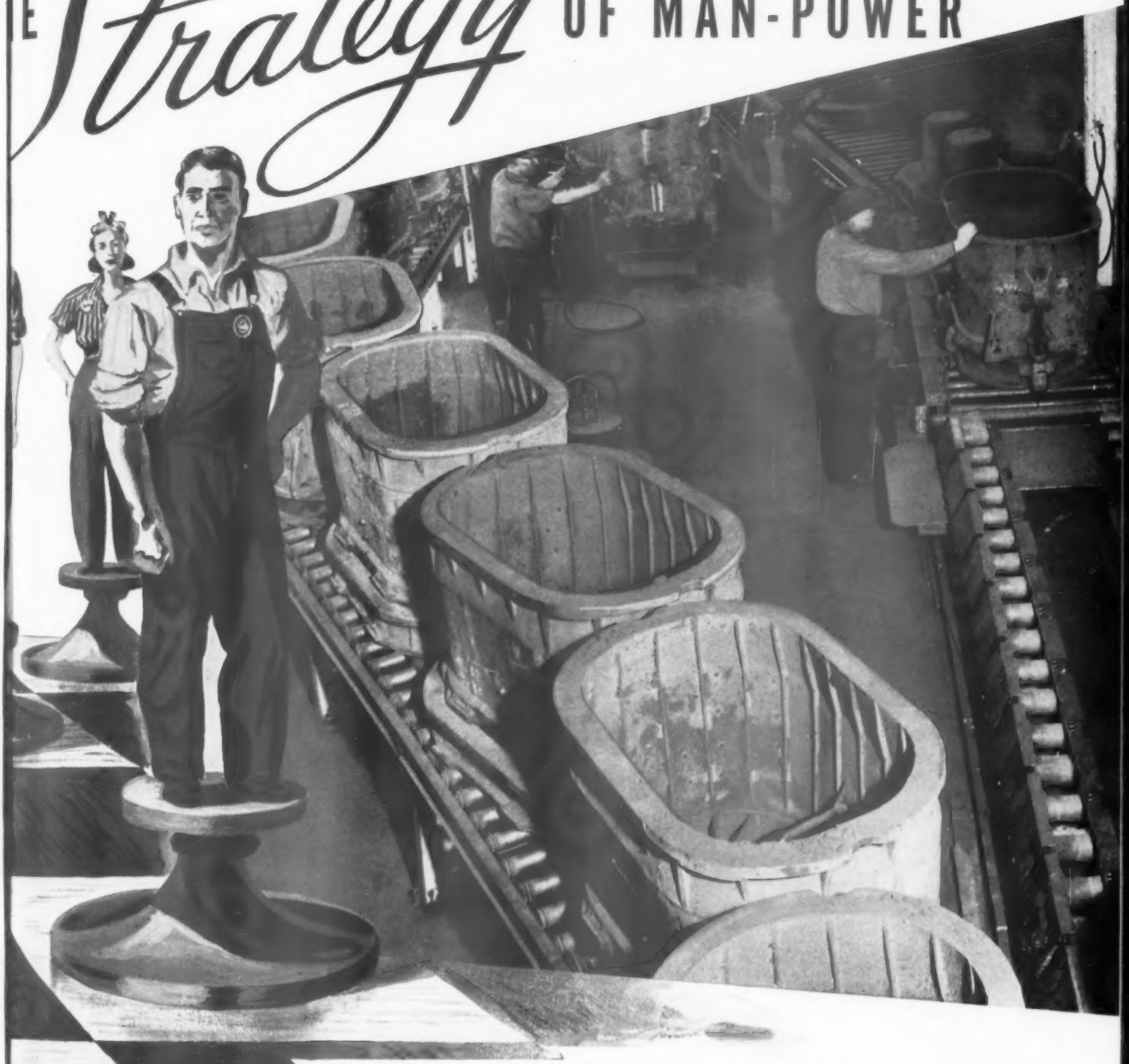
---

Saginaw Malleable Iron Division is melting approximately 250 tons of cast steel in a 24-hour operation, following completion of the conversion of part of its plant to a steel foundry. When the United States entered the war, the company was engaged in enlarging its capacity for production of malleable iron castings. War requirements pointed to tremendous increase in demand for steel castings, particularly for tanks and other combat vehicles, and the company decided to equip itself to make these products—a move which has been instrumental in breaking one of the bottlenecks in tank production and still is of great importance in meeting tank schedules.

Steel melting department at the Saginaw plant occupies about 7800 square feet of floor space and is equipped with two large and one small, acid cold-melt electric furnaces. Layout of the foundry is designed for continuous, synchronized operations; and as a basic factor in maintaining this continuity, the furnaces are

(*Concluded on page* 118)

# E *Strategy* OF MAN-POWER



**RELIEVING VITAL MAN-POWER** of unnecessary fatigue . . . avoiding unnecessary handling . . . saving unnecessary steps . . . keeping a constant flow of material moving to waiting hands and machines, that's man-power strategy headed towards victory.

America's war industries from coast to coast are improving their per-man-and-machine-hour production schedules with the aid of Mathews Time-Coordinated Conveyer Systems.

If you are manufacturing war material, or anything vital to the success of the war effort, you can get Mathews Conveyers to handle that material. Rely as usual on your Mathews Engineer.

MATHEWS CONVEYERS FOR MECHANIZED PRODUCTION

## MATHEWS CONVEYER COMPANY

ELLWOOD CITY
PENNSYLVANIA

(*Concluded from page* 116)

fired and tapped in rotation, thus delivering an uninterrupted supply of molten steel to the pouring section of the mold conveyor.

This is the only General Motors plant producing cast steel. Saginaw's remaining facilities are devoted to pearlitic malleable iron output.

Reviewing the history of the new steel operation at the Malleable Division, James H. Smith, general manager, has pointed out that in January, 1942, the necessary priorities were obtained to enable the purchase of additional equipment needed to complement existing facilities for a tentative production capacity of 2500 tons of steel castings per month.

First experimental heat was poured March 2, 1942, and by the latter part of that month production castings were moving into the finishing departments in steadily increasing numbers. Last October, the first month when all melting units had been installed and were in operation, production was slightly in excess of 2700 tons.

Mr. Smith had the following to say about the future of the steel casting industry: "The picture of the steel casting industry prior to the war does not necessarily form a set pattern which cannot be changed and improved when peace comes again. The accelerated pace of steel casting production during the war, if wisely matched with improved manufacturing methods and improved metallurgical control resulting in a lower-cost, higher-quality production, can do much to break down the traditional antipathy toward steel castings, and bring consideration of their possible use in the postwar period in fields heretofore conceded to other materials or other forms of steel."

## Foundries Trail in Safety Contest

Foundries showed up poorly in the record for the first eight months of the National Safety Council's annual safety contest for the Metals Section. Accident frequency rate for the foundry industry from last July through February, 1943 was 22.34, the highest for any division, and comparing with an average frequency of 9.07 for all divisions. Frequency rate for foundries was 7 per cent higher than a year ago, against an average increase of 8 per cent.

Best records among large foundries were made by E. I. duPont de Nemours & Co. Inc., Wilmington Shops; American Radiator & Standard Sanitary Corp., Louisville, and James B. Clow & Sons, Coshocton, O. Among small foundries the lowest frequency rates were established by Louisville Car Wheel & Railway Supply Co., Louisville; Republic Steel Corp., Ideal Foundry Division, Newton Falls, O., and James B. Clow & Sons, Newcomerstown, O. The duPont and Louisville Car Wheel plants had perfect records for the first 8 months.

## Teach Instrument Use

Johns Hopkins University, Baltimore, has established a special course to train technicians in the use of industrial instruments and controls. Brown Instrument division of the Minneapolis-Honeywell Regulator is co-operating in the educational program by assigning as guest lecturers, members of its Philadelphia technical staff. Sixty picked men from Baltimore area war plants are attending the classes.

## Engine Builder Has New Core Shop

New core department at the Mt. Vernon, O., plant of the Cooper-Bessemer Corp., recently completed at a cost of $300,000, part of a $750,000 Defense Plant Corp. program, embraces some of the latest methods of handling sand by the carload and of drying the cores. The new building 120 x140 feet, was built to relieve an over-crowded condition in the former core room. The latter, occupying space in the foundry building, had been pushed to capacity for many months in turning out engines and compressors for the government and war plants. Some of these individual castings weigh over 60,000 pounds.

A spur track brings the hopper bottom freight cars close to the side of the building where the sand is discharged by gravity to two concrete pits extending under the floor and with capacity of three carloads each. The cars are released in a fraction of the time formerly required when the sand was unloaded by crane and grab bucket. Sand from the pits is taken by wheelbarrow to a central skip hoist which discharges the sand in measured batches into the muller type of mixing plant on the main floor. From the muller the prepared sand is carried by electric truck to the various coremaking stations.

Cores are dried in a battery of seven ovens supplied by the Foundry Equipment Co., Cleveland. Each unit in the battery of four car type ovens is 6 feet wide, 10 feet high and 25 feet in length. Each of three smaller rack type ovens is 6 feet high, 7 feet wide and 13 feet in length. Ovens are fired with natural gas through heating units on the roof. The combustion system is of the recirculating type with automatic temperature control. Double steel walls of these modern ovens are insulated with rock wool, a feature which results in ease and speed of erection, considerable saving in fuel and simplicity of maintenance. If the need arises, these ovens, being entirely above floor level, readily may be moved to any other location.

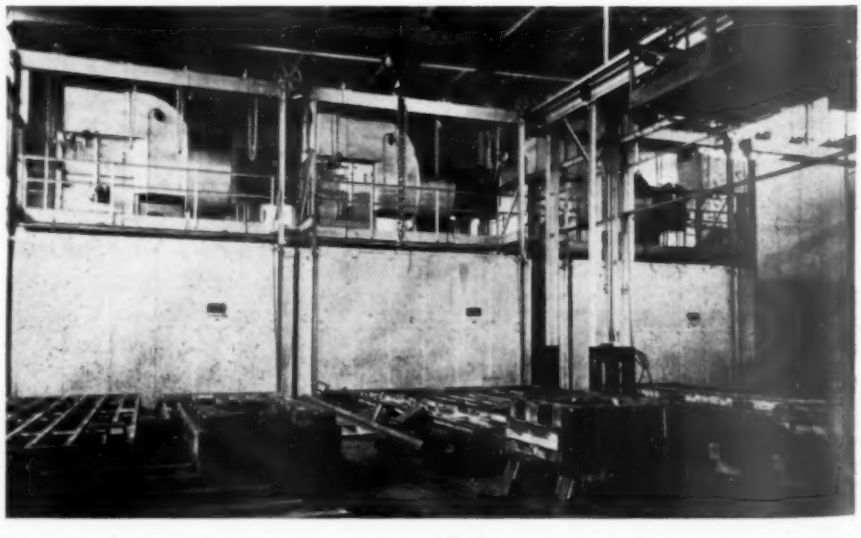
Large cores are made in coreboxes on the floor or on jolt machines. Small cores are made on benches. Each bench is served by an overhead sand hopper which supplies sand to two men. Hoppers are loaded by crane and bucket. The plant, amply lighted and ventilated, is provided with wash room and locker facilities.

## American Cited for Production Record

American Foundry Equipment Co., Mishawaka, Ind., has been picked by the Army and Navy, on recommendation of the War Production Board, to receive the "E" production award for "great accomplishment in the production of war equipment."

Ceremonies for the formal awarding of the "E" flag and lapel pins for employes were held at the company's plant April 16. Details of the presentation will be described in a subsequent issue.

Equipment manufactured by the American company consists of blast cleaning, dust collecting, sand conditioning and metal washing equipment, and electric air heaters—all of which is employed in war work.



*Part of a battery of seven core ovens installed in new core department of Cooper-Bessemer Corp., Mt. Vernon, O.*

# DO IT FAST · · DO IT RIGHT

*with*

# SPO MOLDING MACHINES

*SPO No. 100 Series*

## IT'S AS HANDY AS A GOOD OLD SHOVEL

The SPO No. 100 Series air-operated Jolt Squeeze Molding Machines are about as versatile as any one could ask. They do many kinds of work well. They excel on jobs involving match-plates and gated patterns. The open-end squeeze head permits the use of extra long flasks.

CONVENIENCE. The handier the equipment, the better your molder performs. The vibrator knee valve, jolt knee valve, squeezer-operating valve, blow valve, riddle rack and closing bench are all located for quick action. So are the lubricating points. The squeeze plate is adjustable in 2" steps for various flask heights.

PRODUCTION. SPO No. 100's are fast. They turn out three or four times as many molds as hand or bench methods,—*with less skilled labor.* Your more skilled employees can be put on more specialized assignments where they can do themselves and you more good.

UNIFORMITY. Carefully balanced design and distribution of weight make for rigidity, which makes for precision molding. You can depend upon the *last mold* being *as accurate as the first.*

ALSO. Automatic pressure release valve controls squeeze piston on molds. Safety stop keeps squeeze piston from leaving cylinder. Jolt squeeze insures evenly packed molds. Few moving parts, well shielded against sand and grit. Stationary and portable models. Range of sizes.

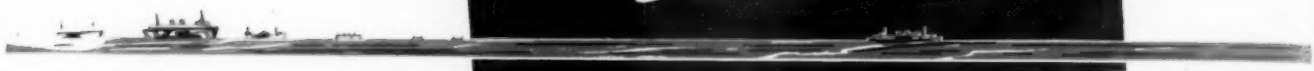
SPO

# INCORPORATED

*Manufacturers and Specialists in Molding Machines, Vibrators and Patterns for Production*

**7500 GRAND DIVISION AVENUE • • CLEVELAND, OHIO**

# FOUNDRY DEVELOPMENTS
## *At short range*



FOR those who have experimented with or considered the possibilities of using a material of low thermal conductivity to surround the riser of a casting so that it will remain liquid longer and thus extend the feeding period, it is suggested that a sand-sawdust mixture be tried. The second *Report of the Molding Materials sub-committee of the Steel Castings Research Committee* (Great Britain) investigated a number of materials for such purpose, and found that two mixtures gave the lowest thermal conductivity. One was composed of silica sand, 25 per cent sawdust (—8, +22 sieve), and 10 per cent clay, and had a thermal conductivity of 1.33 b.t.u. The other of similar composition except that the sawdust content was 50 per cent had a thermal conductivity of 0.67 b.t.u. One thing that must be watched in use of such a mixture is to see that it does not contaminate the backing sand during the shakeout.

♦ ♦ ♦

In welding bronze and other nonferrous castings for salvage or other purposes, it should be remembered that the welding operation metallurgically is similar to casting, and care should be taken in selecting the filler rod. It is impossible to avoid the loss of some of the active deoxidizers, such as phosphorus, manganese or silicon and therefore, the rod must be designed so that after being laid in place it will have a composition identical to the base metal if that is what is desired.

♦ ♦ ♦

According to one inventor cast iron and malleable cast iron can be strengthened and improved by the rather simple procedure of treating the alloy after it comes from the melting unit with 0.2 per cent by weight of various substances such as paraffin, stearic acid, fats, beeswax and spermacetti. While he does not describe the method of addition, he states in his patent that it results in less porosity of the metal with resultant reduction in shrinkage and sponginess; the microstructure is finer and denser and more uniform throughout, and the graphite is fine. Also the transverse and tensile strengths are increased 25 per cent above that of iron not so treated. It also is claimed that the size of the feeding risers may be reduced.

♦ ♦ ♦

It is well known that it is difficult to obtain firm, nonporous oxide coatings on magnesium alloys for protective purposes, but according to a recent patent they can be obtained by electrolysis just as easily as in the case of aluminum alloys. The bath or electrolyte is composed of about 5 per cent sodium aluminate, 3 per cent sodium fluoride and 5 per cent trisodium phosphate. Current used may be alternating, alternating with direct current superimposed, or direct current, and the current density used is 1.5 amperes per square decimeter. Arsenates and phosphates may be added to the bath. It is claimed that the treatment provides a closely adherent, nonporous coating which prevents corrosion and resists wear. The coating may be densified and colored, and gives an excellent support for paints and varnishes.

♦ ♦ ♦

OLD employes are supposed to be more safety conscious than the green workers who have entered industry recently, but American Brake Shoe & Foundry Co. has had the opposite experience. It reports that lost-time accidents have been proportionately more numerous among old employes than among the new ones.

♦ ♦ ♦

A rather unusual procedure for centrifugally casting turbine blades for superchargers which are made of high alloy steel to resist heat and corrosion is described in a recent patent. The molding practice follows that in the cire perdue or lost wax process except that the patterns are made of tin or other low melting alloy. The reason for using such pattern is to insure exact reproduction, and also to provide a 1-piece mold. Mold is made from a composition comprised of 9 pounds graphite carbon, 200 mesh and finer; ½-pound fireclay; 1½ pounds glucose, and 4 ounces water. The material is rammed around the pattern which is dried under gradually increasing temperature until the alloy forming the pattern melts and runs out. A number of patterns are located radially in the mold which is poured through a central sprue. Cylindrical gates extend radially from the central sprue beyond the end of the casting proper to form a pocket for catching any dirt, etc. Metal flows down the gate into the pocket and backs into the casting.

♦ ♦ ♦

A new type of alkali aluminum silicate coating for iron and steel products has been developed which is claimed to possess exceptional rust or corrosion resistance. It also is resistant to impact and abrasion, thermal shock, and some acids and alkalis. The material is applied by spraying or dipping and then heated to 750 to 800 degrees Fahr. which combines the coating ingredients into a hard, heat resisting finish; insoluble in boiling water. One or two coats ranging from 0.0005 to 0.0010-inch in thickness may be used.

♦ ♦ ♦

Cast steel tank treads or shoes subjected to severe service conditions conform to exacting physical and chemical specifications including an ultimate tensile strength of 105,000 pounds per square inch, yield point of 90,000 pounds per square inch, brinell hardness 228 to 285, elongation in 2 inches 16 per cent, and Izod impact 30 foot-pounds minimum. Chemical analysis includes 0.25 to 0.35 per cent carbon, 0.25 to 0.35 per cent silicon, 0.05 per cent sulphur maximum, 0.06 per cent phosphorus maximum, 1.25 to 1.65 per cent manganese, 0.20 to 0.30 per cent molybdenum. Castings are heat treated and quenched.

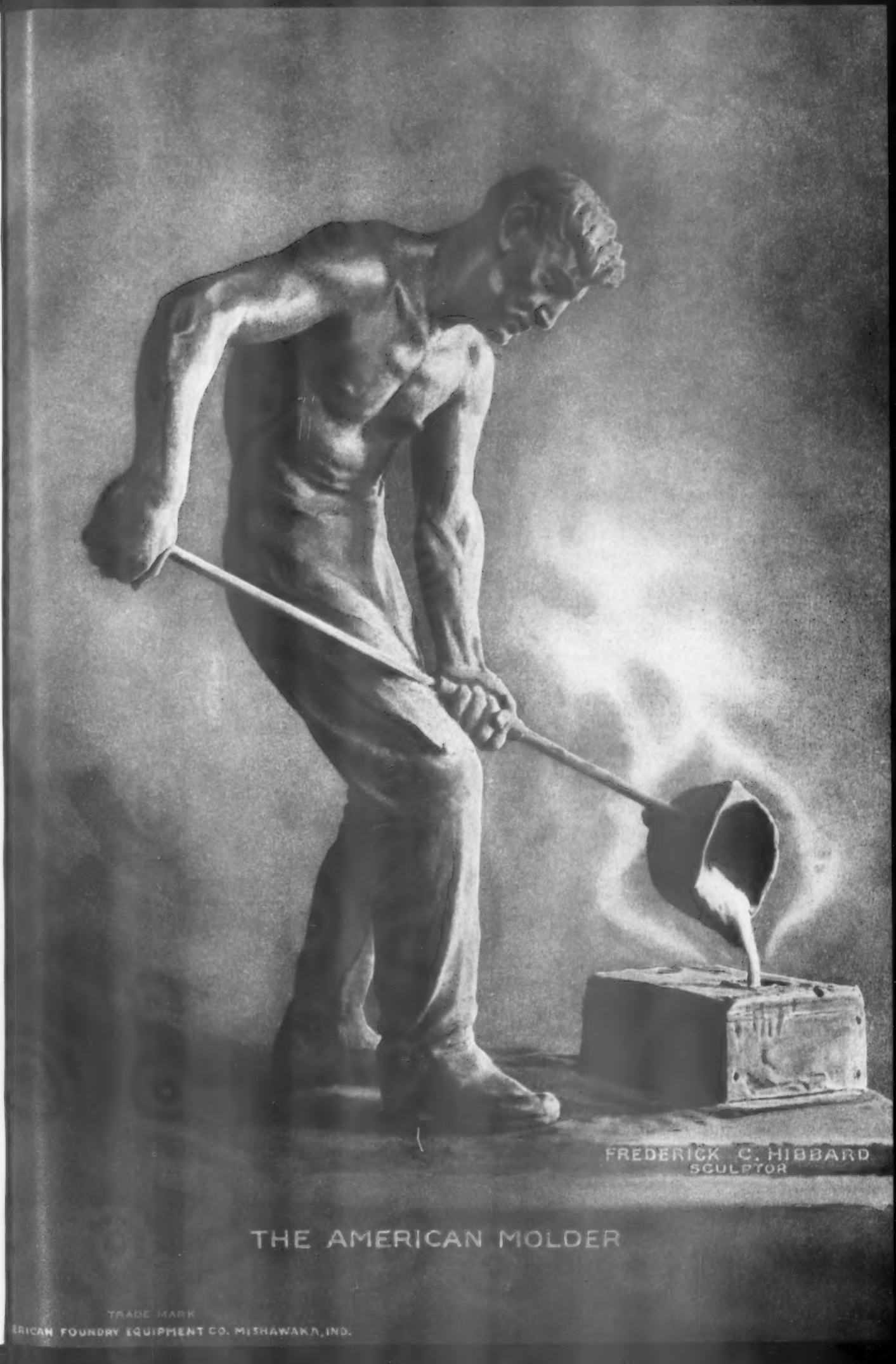
♦ ♦ ♦

According to *Silicate P's and Q's* several procedures may be used for sealing porous castings with sodium silicate. Simplest is soaking in a bath of dilute silicate, draining and drying. However, where porosity is fine the silicate will not be absorbed by that procedure, so the solution is pumped into the castings under air pressure which is maintained as long as the liquid sweats through. In extreme cases the castings first are placed under a vacuum in order to obtain maximum penetration. When the porous areas have been filled, the treated castings are drained and dried. If subjected only to gases or non-aqueous solvents ordinary air drying may be sufficient. If they are to be in contact with water solutions they should be baked. Steam may rehydrate oven dried silicate so the castings should be given a calcium chloride dip. Some operators use an acid to precipitate insoluble silica, but in either case oven treatment should follow.

♦ ♦ ♦

With some types of centrifugal castings it is desirable to have the mold rotating at a slow rate of speed when the metal is introduced after which it is rotated at full speed. To attain those results a variable speed motor may be used, but a recent patent describes a different means which could be used although its application is for rotating the mold between heats, etc. The slow motion drive consists of a worm gear on the drive shaft of the centrifugal machine

(*Concluded on page* 125)


FREDERICK C. HIBBARD
SCULPTOR
THE AMERICAN MOLDER
TRADE MARK
ERICAN FOUNDRY EQUIPMENT CO. MISHAWAKA, IND.

*To*

# AMERICAN FOUNDRY EQUIPMENT CO.

## "For Great Accomplishment in the Production of War Equipment"

A spirited ceremony was held at the plant of the Company on April 16, 1943.

**We Are Proud and Grateful For This High Honor**

WE ARE proud to be among the first of the builders of Foundry equipment to win the Army-Navy "E" Award, signifying excellence in both Army and Navy production.

For this honor we pay sincere tribute to the zeal and patriotism of our employees, and to the cooperation of our customers, business associates, and suppliers.

Since the defense program was initiated, our production of blast cleaning and dust collecting equipment has multiplied many times . . . and "round-the-clock" engineering research has contributed a constant flow of new and improved equipment designs and methods to solve customers' problems and to speed war production.

But the battle is not over. The "E" award makes us aware—even more than ever—of the responsibilities with which we have been entrusted. We shall fly the flag proudly as an emblem of work well done—and as a reminder and challenge to still greater achievements.

TRADE MARK
THE AMERICAN MOLDER

**AMERICAN**
**FOUNDRY EQUIPMENT CO.**

WAR DEPARTMENT
OFFICE OF THE UNDER SECRETARY
WASHINGTON, D. C.

March 20, 1943

To the Men and Women
of the American Foundry Equipment Company
500 South Byrkit Street
Mishawaka, Indiana

This is to inform you that the Army and Navy, on the recommendation of the War Production Board, are conferring upon you the Army-Navy Production Award for great accomplishment in the production of war equipment.

This award symbolizes your country's appreciation of the achievement of every man and woman in the American Foundry Equipment Company. It consists of a flag to be flown above your plant and a lapel pin which each of you may wear as a sign of distinguished service to your country.

I am confident that your outstanding record will bring victory nearer by inspiring others to similar high achievement.

Sincerely yours,

Robert P. Patterson,
Under Secretary of War

**and Accept the Challenge to Even Greater Achievement**

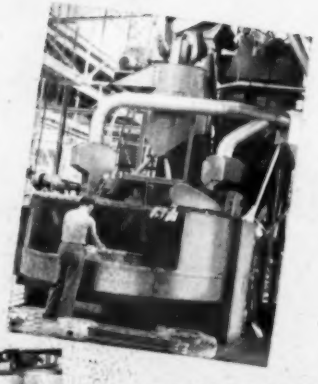
ARMY E NAVY

# ..and WE Will Keep It Flying

[redacted]

## WHEELABRATOR SPECIAL CABINETS

Designed and built for handling special and unusual cleaning problems.



## WHEELABRATOR TUMBLASTS

Tumblasts are built in 8 sizes ranging from 1 cu. ft. up to and including 63 cu. ft. operating load capacity.

## WHEELABRATOR TABLASTS

Tablasts (Multi-table and Plain-table types) are built in a wide variety of sizes for handling flat or fragile work.

## DUST COLLECTING EQUIPMENT

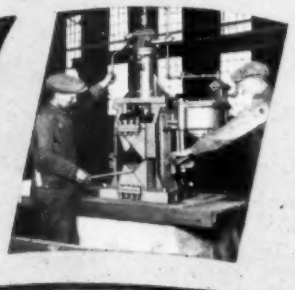
Consists of Dustube (cloth bag type) collectors, High Efficiency Cyclone collectors and Wet Disposal Units.

## SANDCUTTERS

Built in four models and numerous sizes for conditioning and piling foundry sand.

## CORE ROD STRAIGHTENERS

For reclaiming core rods and forming gaggers. Made in four sizes.



*World's Largest Builders of Airless Blast Equipment*

[redacted]

505 S. BYRKIT ST. MISHAWAKA, IND.

## BEING CLEANED by the *Airless* WHEELABRATOR

[redacted]

Gears
Connecting rods
Crankcases
Crankshafts
Valves
Valve springs
Cylinders
Propeller blades
Propeller hubs
Bearings
Carburetors
Fuel pumps
Parachute buckles
Spark plug rings

[redacted]

Gun barrels
Rifle parts
Gun sight pieces
Metallic belt links
Shells
Bombs
Bomb parts
Shell caps
Trench mortar shells
Gun mount pieces
Precision parts
Cannon parts
Gun trunnion blocks

[redacted]

Pins
Bogie wheels
Treads
Links
Motor parts
Bearings
Gears
Housing pieces
Armor plate
Turrets
Generator pieces

[redacted]

Armor plate
Anchor chain
Engine castings
Bearings
Motor frames
Transmitter cases
Generator parts
Valves
Fittings
Turbine parts

(*Concluded from page 120*)

That gear is driven by a worm with a separate driving means, and is arranged on a pivot with suitable universal joints in the drive shaft so that it may be engaged or disengaged. The worm also is attached to its shaft so that in case the main drive of the machine is rotating the shaft at a high speed, the worm slides along the shaft and is disengaged.

♦ ♦ ♦

To control admission of air into the tuyeres of a cupola so that uniform distribution to each is assured, a recent patent describes the application of vane-type or flap valves interposed between the windbox and tuyeres. Various means of controlling the movement of the valves are described.

## Recommends Proper Compressor Care

Numerous suggestions for the proper care of compressed air equipment are offered in a series of articles prepared by the Compressed Air Institute. The general subject is treated more exhaustively in *Trade Standards* published by the institute, 90 West Street, New York.

Among the more important recommendations is the establishment of an engine room log requiring the recording of operating data at definite periods throughout the day; also the log should record what routine daily, weekly and monthly inspections must be made. Instead of running the compressor without shutdown until some part is damaged, it is suggested that valves be removed and examined every 6 months (every 2 months if the equipment is in 24-hour daily use). Cylinder walls should be inspected regularly.

At predetermined periods, the entire compressor should be examined for worn parts. Water jackets should be thoroughly cleaned at frequent intervals. Intake filters should be cleaned at stated periods, and the intake should be so located as to obtain the coolest and cleanest air possible. Circulating water for the aftercooler should be as low a temperature as possible for maximum moisture removal from the compressed air. The air line should be blown out thoroughly before it is connected to a pneumatic tool.

All air receivers have drain cocks located near the bottom which must be drained daily, or, if no aftercoolers are used in the system, the receiver should be drained several times daily on damp humid days when the air contains a maximum of moisture. Safety valves on receivers should be tested occasionally.

Leaks in the piping system are easily detected and should be corrected promptly because they are costly. Leakage of air at 100 pounds pressure through a single $\frac{3}{8}$-inch orifice would amount to about 6,000,000 cubic feet per month; at 6 cents a thousand cubic feet, this loss would be $360 per month.

A new compressor may require more lubrication than one in which the cylinders have become glazed. Examination of cylinder walls can determine whether lubrication is adequate. An excessive amount of oil in the discharge is undesirable and should be avoided. Instructions of the manufacturer regarding lubrication should be followed carefully.

## Castings Handled by Elevator

Heat treating and quenching of castings is facilitated at Aluminum Castings Inc., Cincinnati, by use of an elevator located in front of the heating furnace. Equipped with track rollers at two levels, the elevator permits a continuous cycle of operations.

Two load platforms are used to keep the charges moving. While one is inside the furnace, the other is being loaded. Upon completion of the heating, the platform is pulled from the furnace and into the elevator by an air hoist that serves as a winch. The cage then is dropped into the sunken quenching bath. With the elevator in this position, the top of the cage is level with the furnace floor and the second loaded platform can be moved over the upper track into the furnace.

When the quench is completed, the elevator is raised, the platform rolled off and unloaded, and a new batch of castings is loaded. Each platform handles 4 tons of castings.

Operated by compressed air at 80 pounds per square inch, the elevator has a travel of 9 feet at a speed of 60 feet a minute and measures 8 x 15 x 7 feet. The furnace and elevator were designed and built by Despatch Oven Co., Minneapolis.

## Receives Maritime Commission "M"

Paxton-Mitchell Co., Omaha, Nebr., has won the Maritime Commission's "M" for outstanding production of machine and engine parts for cargo ships. Presentation of the "M" pennant was made at the Omaha plant March 19 by Samuel B. Hicks, of the office of the commission's regional director of construction, Chicago. It was received by James L. Paxton, Jr., president of the company. Individual merit badges were presented to the 350 employes.

As subcontractor for many engine and pump manufacturers in the Liberty Ship program, Paxton-Mitchell supplies cast iron cylinders and valve liners, relief valves, metallic packing, and bronze pump liners.

Nitralloy Corp., 230 Park avenue, New York, has issued a 105-page booklet on "Hardness", by D. Landau which bears the subtitle, "A Critical Examination of Hardness, Dynamic Hardness and an Attempt to Reduce Hardness to Dimensional Analysis". It discusses the historical evolution of hardness testing, various hardness testing procedures, and the possible trend in hardness research.

## Protective Lighting Standard Set

A war standard for protective lighting of industrial properties has been announced by the American Standards Association. Intended as a guide for outdoor protective lighting to those whose responsibility it is to provide for plant protection from theft and sabotage, the standard sets forth the principles involved, the chief areas to be lighted, and the minimum degree of illumination considered necessary for the detection of persons bent on theft or sabotage. It also recommends procedure to be followed in preventing sabotage to vital buildings, structures or equipments. Copies are available from the association, 29 West 39th Street, New York, at 50 cents each.

## Wins Third Navy "E"

A third All-Navy "E" award has been won by Farrel-Birmingham Co. Inc., Ansonia, Conn. Each of the company's three plants—at Ansonia and Derby, Conn., and Buffalo—is now privileged to fly the Navy "E" burgee with two white stars added. The company is manufacturing gear drives for Navy and Maritime Commission ships, in addition to heavy industrial machinery.

## Book Review

1942 *Book of A.S.T.M. Standards* (Part I—Metals); published by American Society for Testing Materials, 260 South Broad street, Philadelphia; 1730 pages, 6 x 9 inches. Price $9.00 for non-members, $6.00 to members for extra copies.

This triennial publication incorporates 355 A.S.T.M. specifications, definitions and methods of test—except methods of chemical analysis—of ferrous and nonferrous metals. A separate volume on Chemical Analysis of Metals is available. Included are emergency standards and emergency alternate provisions, the latter being intended to aid in expediting procurement and in conserving critical and strategic materials. New features are incorporated, including double-column format, improved editorial style, detailed subject indexes, and two tables of contents (one by subject, the other by serial designations of standards).

The section on steel castings includes 13 specifications, comprising four for carbon steel, eight for alloy steel and one covering both carbon and alloy material for railroads. Four specifications for gray iron castings are listed, also three for cast iron pipe and four for malleable iron castings. General methods of testing ferrous metals are treated extensively under 25 separate standards. Equally comprehensive standards are included for testing of nonferrous metals. Four specifications for aluminum and aluminum base alloys and one for magnesium-base alloy sand castings are incorporated under the nonferrous metals section which also includes 16 specifications for copper and copper alloy castings.

# the adventures of BILL

BY PAT DWYER

Drawings By RICHEY

HAVE you ever heard," said Bill, "an old saying or a proverb or a parable or something about wishing to see ourselves as others see us. The general idea so far as I remember is that a good look at ourselves through the eyes of another person would knock out the dose of conceit and one thing or another which makes up so much of the warp and woof of the ordinary human being."

"In all probability," I said, "the spirit or the essence of what you have in mind has occurred to thousands, perhaps millions of people, white, black, red, brown and yellow and speaking every language under the sun. However, since you and I are familiar with only one language, and not too much of that, I think I am inside quite conservative bounds when I assume that you refer to the opening lines in a poem written by the late Mr. Burns, known to Scots the wide world over as Rab, Rabbie, Robbie or Bobbie. I would-ah-prefer not to give you the circumstances or the line of thought which influenced our hero to write the poem. These factors are only of minor importance. Rab could dash off a poem on practically any subject without a moment's hesitation. In fact some of the cleverest and therefore unprintable things were tossed off extemporaneously in the presence of a few convivial cronies engaged in tossing off all the available barley bree in any given pub at any given time."

"Do you happen to remember any of 'em?"

"Certainly I—Listen. I don't see any useful purpose will be served by retailing these undoubtedly witty, but equally undoubtedly shady jests. There is a place and a time for everything. This is not the time and you will pardon me for reminding you that we are not at a stag party or a molder's smoker."

"O.K.," said Bill. "Have it your way, but I have heard some rib tickling nifties pulled in these here now very same places. How about that poem you were going to quote some time back. I trust," he added, with elaborate mock concern, "it has been thoroughly fumigated and sterilized so that it will not bring the faintest blush to these chaste ears."

"Well," I admitted, "we all have our little pet foibles and if you wish to apply the term chaste to those Clark Gable appendages, who am I to wish that you could see yourself as others see you. And that brings us back if you please to where we started, the opening lines of Burns' poem:

Oh, wad some power the gifties gie us
To see oursel'es as ithers see us!
It wad frae mony a blunder free us
And foolish notions.

"Now that point presumably is settled to the full and complete satisfaction of one and all, would you mind telling me the why and the wherefore of this sudden interest in subjects poetical."

"Well," said Bill, "I'll tell you. I got a letter and a newspaper clipping from my old friend Stanley Brinson, Master Molder, Norfolk Navy Yard. The story in a Norfolk paper described the operations in a Cleveland aluminum and magnesium foundry and covered so many marvelous features that Comrade Brinson could not believe his eyes. He wondered if foundry practice had jumped so far ahead recently that he was out of the procession altogether. Since I lived in the city where the foundry is located and since presumably I was familiar with the setup and method of operation, he wondered if I was asleep at the switch. It was a strange thing indeed if two newspaper reporters could go into a plant and discover thrilling features never before seen in the heavens above, the earth beneath or in the waters under the earth. You have been in that foundry and have written stories about certain outstanding performances. Apparently you went around with your eyes shut. You missed all the human interest stuff visible only to the eyes of the trained and skilled reporter. That is what made me think of that saying about seeing ourselves as others see us. Listen to this masterpiece and see if it does not knock all the literary ego out of you.

*Takes two strong men to believe it*

The story is headed Foundry Men and Women Work in Stinging Smoke, by George Arklow and James Kasiska (Before I finish," said Bill, "you will see why two men were needed on the job.")

Cleveland, April 9 — (AP) — "Does Hitler with his slave labor think he could overcome a country with workers like this?" says a man, a production boss, standing in the stinging smoke of the foundry.

His voice is high and flat in the shrill roar of drills and hammers and high pressure gas flames that never stops day or night.

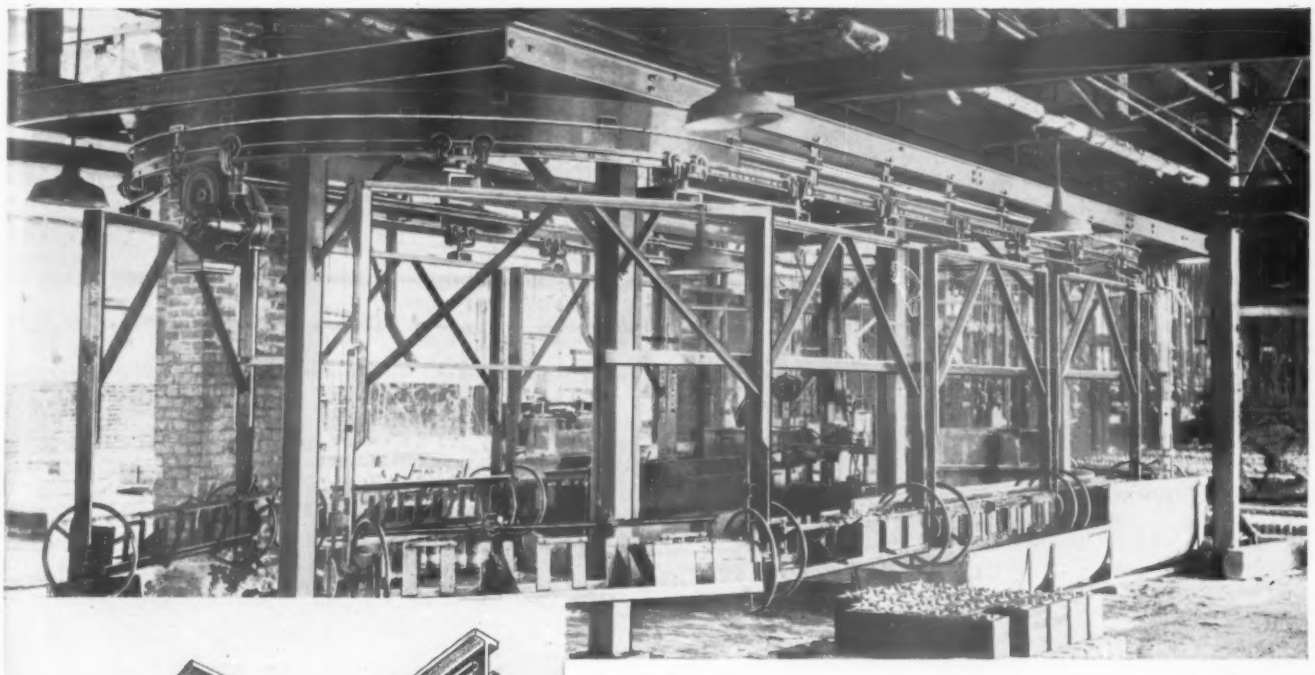
Men and women, white and negro, move steadily about their work in this pungent sector of the home front. (The approved newspaper technique of converting each sentence into a paragraph imparts the necessary punch and drive to the authentic statements.)

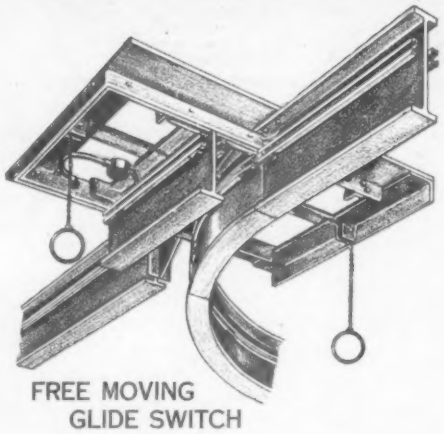
The foundry is small, as foundries go (ho, hum) but it was the first one built here 14 years ago by the Excelsior Foundry Co. Now it has many times the number of workers it used to have, and is turning out four times the work it was meant to do. (This is what is known as factual reporting. All correct except the facts.)

Through the smoke in the busy center aisles, negroes with cloths wrapped around their heads carry molten magnesium in glowing pails that have the angry color of sunburn. (Now that is what I call a flash of true genius and the result of writing a story from memory. The stinging smoke probably got in the writer's eyes and made him see this stately procession of turban topped negroes, each with a glowing pail of magnesium on his head. The carrier would have something more than an angry sunburn to worry about if the pail happened to slop over.)

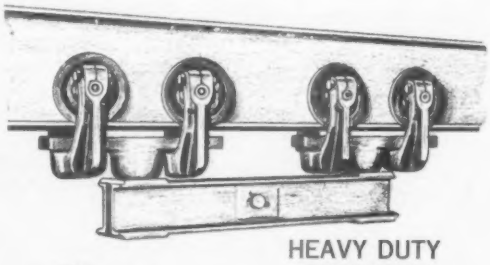
In endless relays they carry the pails and pour the metal into molds hand packed with sand by the women. Spurting smoke and steam from the hot metal and wet sand make the figures of the men vague. (This method, by which women pack sand in the molds by hand probably marks the most revolutionary change in foundry practice since the days of Tubal Cain. No more pounding the sand with big, heavy rammers. No more squeezers, jolters or sandslingers.

(*Concluded on page* 128)

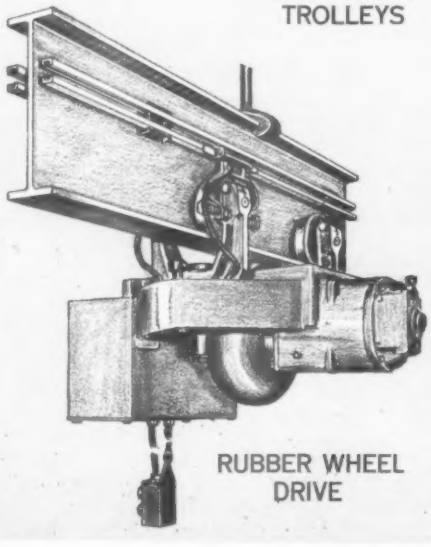




FREE MOVING
GLIDE SWITCH



HEAVY DUTY
TROLLEYS



RUBBER WHEEL
DRIVE

# *Extreme Flexibility*

## OFFERS VERSATILE APPLICATIONS

DON'T let your handling problems impede your war efforts. The production front is all important. But, even NOW you can keep your eye on the future—that post-war period that presents another conversion problem.

American MonoRail Overhead Handling Equipment is extremely flexible. It offers versatile application without costly adjustment or lengthy engineering. Standard parts fit quickly into complete systems.

Equip now for Victory—prepare now for later changes.

Let our engineers show you results obtained in hundreds of installations.

**THE AMERICAN MONORAIL CO.**

13104 Athens Avenue — Cleveland, Ohio

★

(*Concluded from page 126*)

No more flasks to hold the sand in place. Milady sits at ease in a cushioned chair and daintily patty-cakes a few handfulls of sand into the desired shape.)

The sand smoldering like burnt mattresses is attacked with electric drills to break it loose from the casting. The drills break the sand a little. The molds are thrown on bucking machines to shake all the sand free.

The molds rear and bounce on the machines like uncontrollable horses while the men who hold them shake with them. (In the letter which accompanied the clipping Comrade Brinson commented admiringly on this new technique. "Boy," says the comrade, "how those fellows attack the sand with those vicious electric drills. Just like the Marines giving the Japs the works on Guadalcanal." A very happy and pertinent observation.)

A colony of men (A colony, if you please) with cotton in their ears and pneumatic hammers in their hands (presumably a hammer in each hand) knock the rough edges off the finished castings in a roar of metal banging on metal that kill all sound of speech at the lips' edge. (That is figuring it down pretty fine. Just where is the lips' edge? Also may we be pardoned for wondering who was making the speech and why. Is this the phenomenon known in diplomatic circles as having one's words pushed back in one's teeth? It certainly is a tribute to the skill of the writer that the story arouses and holds the interest to the extent of starting so many trains of thought. Obviously it can be appreciated at its true worth only by those who have had actual foundry training and experience.)

Smoke whirls around the great kettles of boiling magnesium heated to 1600 degrees Fahr. In and out of the hot range of the kettles the furnace men dart to dip the metal into pails. (A citation of some kind should be awarded the writer for consistently sticking to pails. An ordinary person, or one less skilled in the art of writing, would be tempted to vary the term now and again and refer to the containers as buckets or pots. Our hero, writing down to the intelligence of his readers, studiously avoided all ambiguous terms. Just the plain simple facts in plain simple language. Mother Goose had the same gift.)

Through half closed eyes these misty figures in the kettle smoke look like sorcerers brewing bitter poison. (Look out now. Here comes the punch that will bring the reader to his feet cheering and wildly waving his hat.) And they are brewing it. Metal that will go into war planes. (There should be a pause here for a ruffle on the drums and a fanfare on the trumpets and slide trombones. That kettle smoke must be potent stuff.)

This goes on hour after hour, 24 hours a day, seven days a week, one shift of men and women succeeding another while the earth under them shakes from the blows of the giant hammers in the aluminum forge down the road. (Down the road. What road? And which direction is down?)

"Never mind asking silly questions," I said, "You don't know the answers. I don't know the answers and so far as I can see, the authors do not know whether they are coming or going. In fact I am getting kind of dizzy myself between the heat and the brew and the pails and the weird composition of the English language. Would you mind hurrying over the remainder. You know there is a limit to even the stoutest stomach."

"Fortunately," said Bill, "there is not much more. Take a good grip on yourself and maybe you can stand it. Where did I leave off? Ah, yes, here it is:

The great exhaust fans can't clear the smoke from the foundry, although the air is changed every three minutes, because the work is constant: metal brewed metal poured, red pails glowing, wet sand smoking, while great electric lights in the ceiling try to pierce downward through the gloom. (Here is where the reporter presents the complete picture and places all the scattered threads in the hands of the reader. Sand, smoke, steam and hot metal—in pails—he never forgets the pails. The great fans do their best, but the best is not good enough. The electric lights in the ceiling glimmer valiantly, but they might as well be shining in the forge down the road. Note that accurate touch about the lights trying to pierce downward in the gloom. The average person would say that the lights had little effect, and let it go at that. That description would not suit our writer with the flair for strict accuracy. He says the lights tried to pierce downward through the gloom. What other direction could they pierce? Presumably, none of the employes was engaged in activities in, at or around the ceiling.)

"Give 'em a small mark for trying," I said, "and push on, if there is any more of this push over effort."

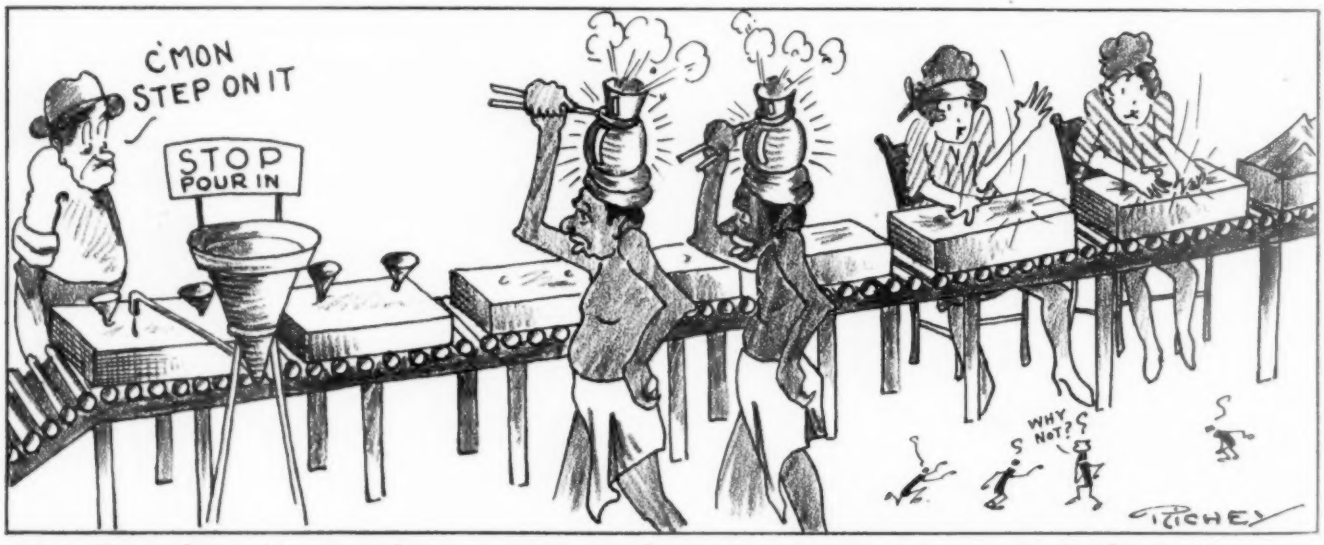
"Just a little smug complacency on the writer's part. Listen:

But only a visitor is impressed by the fierce tempo of the place, and only a visitor would wonder how men and women, bone and muscle could stand up day after day in a place like that and come back gladly to work. The workers don't wonder. It's just another job to them. Some wear goggles, some don't. Some wear oxygen masks, some don't.

"There y'are," said Bill, "as neat a bit of reportorial tripe as I have seen in many a long day, 'Some wear goggles, some don't. Some wear oxygen masks (har, har), some don't!' This lad must have had a good, heavy pair of goggles on the day he visited the foundry, or else some foundry wag with a perverted sense of humor filled his oxygen mask with smoke."

"The innocent naivette of the writers," I said, "reminds me of the well known sermon in which the preacher extolled the omnipotent power of the Creator. 'Just think my dear friends,' he said, 'He who made a mountain, made a molehill. He made the ocean and He made a drop of dew. He made the sun and the stars and He made a firefly. He made me and He made a daisy.'"

"Amen," Bill added solemnly, "O grave where is thy victory. O death where is thy sting!"




*First exclusive picture secured at great expense, reveals some intimate features of magnesium foundry practice*

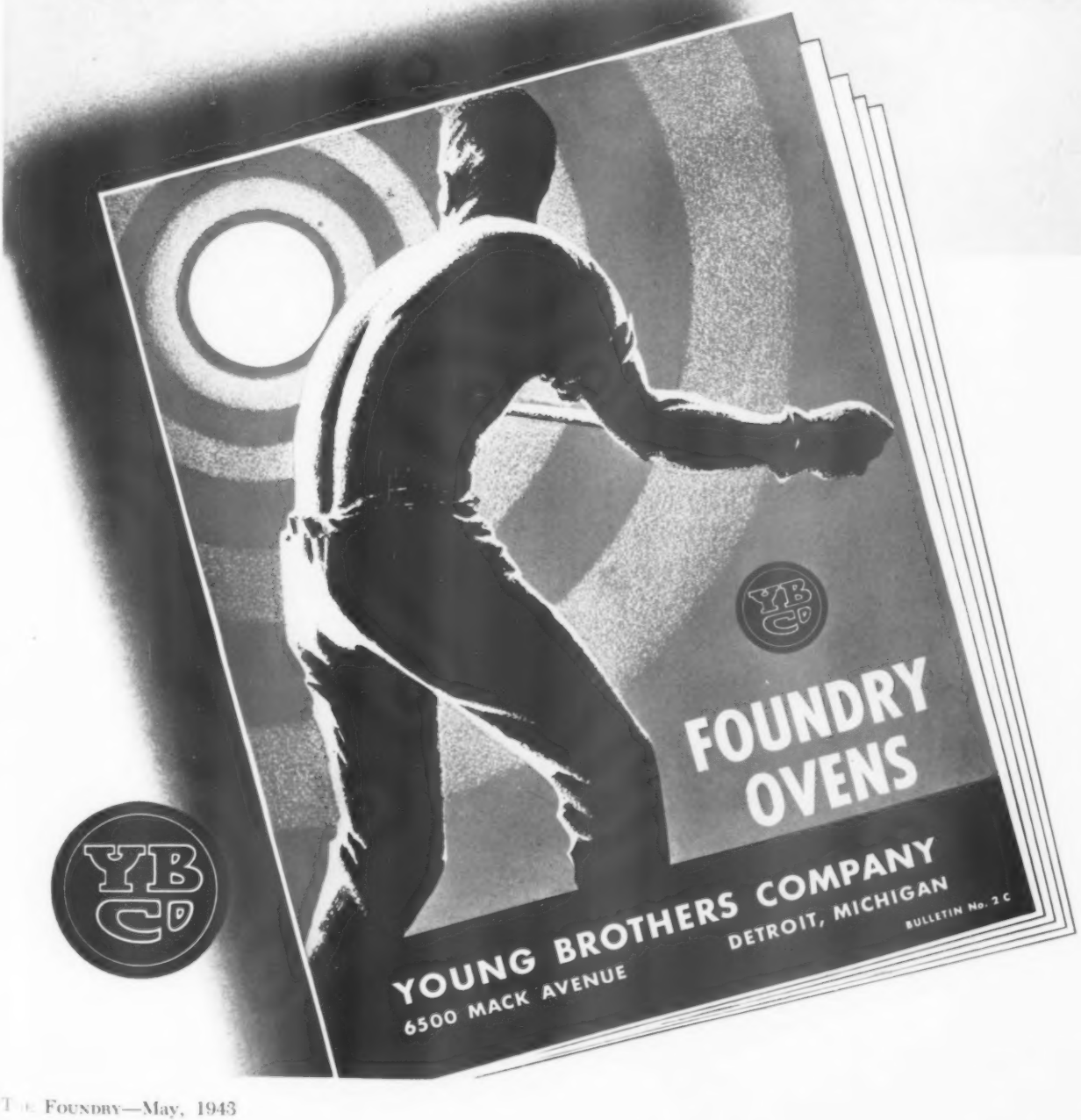
# NEW BULLETIN on FOUNDRY OVENS

**A twelve-page illustrated bulletin on ovens of greatest interest to foundry men has just been published by Young Brothers Company. It covers car type ovens for heavy cores and molds, lift rack ovens, drawer type ovens, shelf and cabinet type ovens, and both horizontal and vertical conveyor ovens. It also treats oven assembly and oven equipment.**

**If you contemplate any changes in your oven equipment, send for a copy of Young Brothers Bulletin 2C for the latest designs and helpful suggestions on oven practice.**

**YOUNG BROTHERS COMPANY**

**6500 MACK AVENUE DETROIT, MICHIGAN**



# INTERNATIONAL MOLDING MACHINES

**Castings** are required for building many of the most vital War Implements. The castings are almost invariably the first parts that are needed when the construction of the implement starts

**WAR Implements** must be made in large quantities and all parts used in their construction must be turned out on a **HIGH PRODUCTION** basis—with ceaseless continuity and perfection.

**USE INTERNATIONAL** to insure the maintenance of casting production schedules. Call for INTERNATIONAL Service Engineers to demonstrate the latest developments in **HIGH SPEED** equipment and methods

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## Melting Practice For

# ACID ELECTRIC STEEL

WITH the increased interest in the production of steel castings to meet the war effort, many existing foundry installations have been expanded enormously, and others have been converted to manufacture steel castings. In both phases numerous problems relating to operations have arisen, and to aid in the clarification of those, the Climax Molybdenum Co. of Michigan, Detroit, has prepared a brief discussion highlighting the various steps to be observed in the production of acid electric steel. The discussion follows:

In the present emergency, many foundries are producing acid electric steel for the first time. This discussion has been prepared primarily for the information of such producers. While it is recognized that there are many methods for producing quality acid electric steel, it is hoped the present discussion will serve as a useful guide for those who are searching for satisfactory acid electric steel practice.

The information presented may have some degree of application in every steel foundry since most foundry variables appear to be of minor consequence as compared with the type of charge, its subsequent oxidation and deoxidation. These subjects are discussed. Only the most singificant steps involved in the production of high grade acid electric steel are included.

Deoxidation procedure should eliminate oxygen as a gas as far as possible and not merely transfer it from iron to silicon or manganese. Hence, the advisability of the following sequence of additions:

1—Pig iron for initial deoxidation.

2—Ferrosilicon for final deoxidation in the furnace.

4—Special deoxidizers in the large receiving ladle.

5—Additional deoxidizer (½-pound aluminum per ton, for example) in pouring ladles to avoid pin holes on the surface of green sand castings.

*A.—Charge:*

The furnace charge may be made up of return scrap, punchings, borings or any other available materials low in deleterious nonferrous metals (tin, arsenic, etc.), phosphorus and sulphur.

1—To avoid bridging, it is advisable to place the light scrap at the bottom of the charge.

2—Add some of the iron ore with the charge. (particularly advisable if high silicon scrap must be charged.)

3—Charge at least 0.15 per cent carbon over the amount called for in the specification. (Add graphite or high carbon pig iron if necessary.)

4—Charge at least 0.60 per cent manganese. (Add spiegeleisen or ferromanganese if necessary.)

5—Keep silicon as low as consistent with available scrap and time permissible for oxidation. (Since silicon must be oxidized before the boil, high silicon prolongs the heat.)

6—Keep sulphur as low as possible. (0.035 per cent maximum is advisable.)

*B.—Melt Down:*

1—Melt as rapidly as possible (high tap).

2—As soon as melt down is complete, use medium or low tap to avoid overheating.

*C.—Working the Heat:*

1—Silicon, manganese and carbon oxidize in the order named. The carbon boil will not be obtained until the silicon and manganese contents are reduced sufficiently.

2—Add additional iron ore if sufficient was not included in the charge. While excess iron ore above that necessary to oxidize silicon, manganese and carbon is advisable; the addition of enough to produce a dull black exterior on the slag test (indicating too much FeO) should be avoided.

3—Adjust the slag to a blue-gray or a blue-green color and reduce viscosity sufficiently to maintain a film under the arc. (8 per cent CaO content generally recommended.)

4—Carbon Reduction:

a—Boil off carbon below 0.15 per cent and 1. Stop boil (if time is at a premium) or, 2. Permit boil to go to completion.

b—Block heat with low silicon, low phosphorus pig iron.

c—Recarburize as needed, allowing for carbon pick-up both from pig iron and subsequent ferroalloy additions.

d—Revert, if necessary to high tap to obtain any necessary increase in tem-

## Core Room Leads in Plant Safety Record

*More than 16,000 employes at Caterpillar Tractor Co., Peoria, Ill., compiled a lost-time accident frequency of 10.3 cases per 1,000,000 man-hours of work during 1942, an all-time record. The best record was compiled in November with a frequency rate of 6.7. In addition, 27 departments completed the entire year without a single lost-time accident. Illustrated is the plaque presnted to the foundry core room, which was rated No. 1 among the 27 accident-free departments. Left to right: M. J. Gregory, factory manager, foundry division; Robert Hodgson, general foreman; Stephen Garry, foreman; Edward Powell, union safety committeeman; H. S. Simpson, company safety engineer*

## Ohio Manufacturer Receives "E" Award

*Desmond-Stephan Mfg. Co., Urbana, O., maker of grinding wheel dressers and vises, was awarded the Army-Navy "E" at plant ceremonies, March 26. Presentation of the flag was made by Maj. Ralph H. Coburn, Cleveland Ordnance District, and accepted by R. S. McConnell, vice president. Lieut. R. A. Hoehne, U. S. N. R., presented the "E" pins to employes, address of acceptance of which was given by Logan Fansler. Shown, left to right, are Mr. McConnell, Major Coburn, Capt. Hugh Reid, Lieut. Hoehne and Mr. Fansler*

perature of the molten bath of steel.
e—Add ferromanganese in furnace (but not to exceed 0.75 per cent manganese).
f—After ferromanganese has dissolved, add ferrosilicon up to a maximum of 0.40 per cent silicon.
g—Tap heat.

*Ladle Additions:*

1—*It is not recommended that aluminum be added in the tapping ladle;* however, any one of several well known deoxidizers such as calcium-silicon, calcium-manganese-silicon, ferrotitanium, alsifer, grainal, etc., may be so added. Additional ferromanganese or ferrosilicon (or both) to meet specification should be added at this time.

2—If castings are made in green sand molds add some aluminum to the pouring ladle to prevent pin holes. (One-half pound per ton is usually sufficient.)

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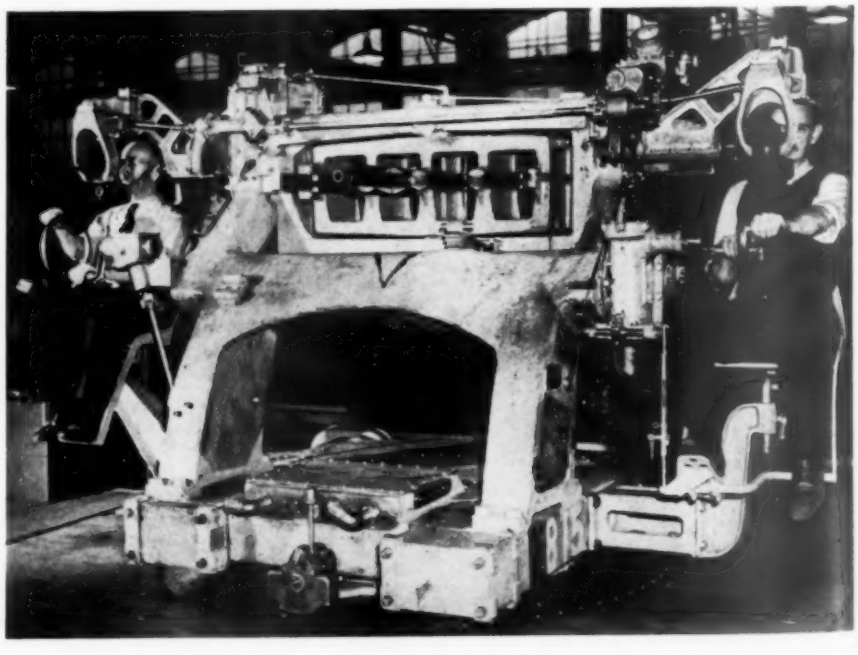
2. Production of Electric Steel for Castings by C. Batty, *Transactions*, American Society for Metals (A.S.S.T.) 1930—Vol. 17, pp. 449-459.
3. Deoxidation and Mold Conditions on the Tensile Properties of Carbon Steel Castings by J. V. McCraw and R. L. Dowdell, *Transactions*, American Society for Metals (A.S.S.T.) 1930—Vol. 18, pp. 159-211.
4. Preparation of Steel to Avoid Porosity in Castings by C. E. Sims, *Transactions*, American Foundrymen's Association, 1934—Vol. 42, pp. 323-338.
5. Dynamic Properties of Steel Castings by Fred Grotts, *Transactions*, American Foundrymen's Association. Vol. 41, pp. 538-553.

## Making Gun Mounts For the Navy

Large-scale manufacture of the new multiple antiaircraft guns now in active duty on every American warship was revealed recently by Frank C. Reed, president, Westinghouse Electric Elevator Co., Jersey City, N. J.

Composed largely of cast parts, each mount weighs 14,000 pounds. It consists of an adjustable 4-foot horizontal gun support in an H-shaped stand attached to a revolving steel base. Each gun support has four large grooves 9 x 13 inches into which water-cooled gun barrels are inserted. Although not synchronized, the four guns are fired in nearly simultaneous bursts by a single trigger mechanism.

Close manufacturing tolerances must be met—0.0002-inch on principal surfaces and 0.004 to 0.001-inch on many other parts. More than 2000 special tools, jigs and fixtures were built.

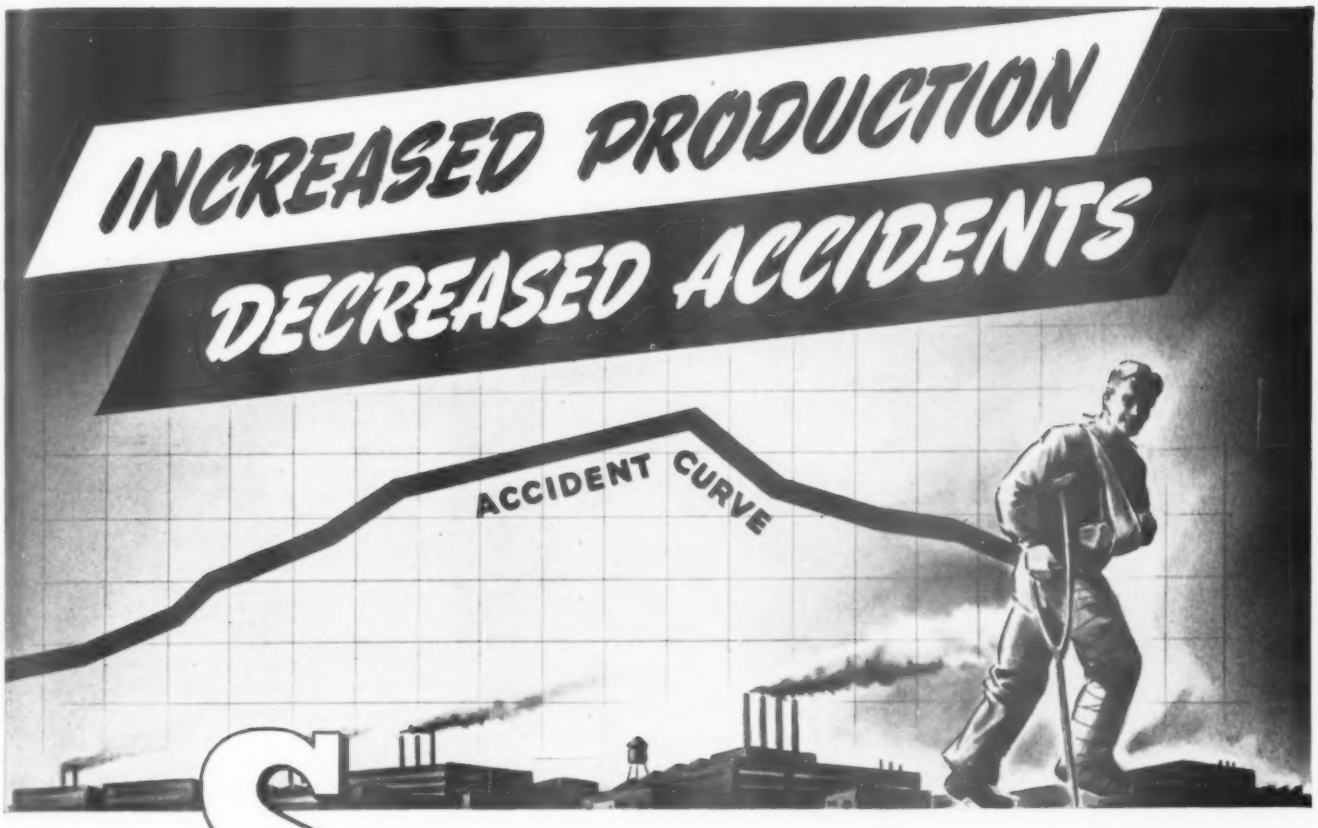


## Offers "Doctor" for Foundry Ills

A foundry survey and diagnosis service—known as the "foundry doctor" plan—has been made available by the Gray Iron Founders' Society Inc. This organization points out that in the course of operation over months and years many inaccuracies in practice and much used equipment creep into a foundry unnoticed by both management and operating personnel. Often the management lacks time to survey his own performance and instigate corrective measures. This new service is intended to locate such faults and recommend remedies.

The society has prepared a formula for thorough foundry investigation, has purchased the necessary equipment and engaged personnel capable of making a complete and unbiased survey. A detailed report is then submitted, diagnosing any troubles and suggesting proper corrections. In order to sustain it on a self-liquidating basis, a moderate per diem fee for time spent in the foundry and expenses of travel and maintenance while on the job will be charged. The

(*Concluded on page* 134)




# SAFETY GRIP-LOK GRINDING WHEELS

If you haven't investigated, there is a new way to insure against grinding wheel injuries to workmen, property damage, and costly time delays by insisting in your specifications that all portable grinding wheels bear the name SAFETY GRIP-LOK.

If unfamiliar with the features of Safety Grip-Lok Grinding Wheels, send your specifications for a trial wheel for use on portable grinders for

| | | |
|---|---|---|
| Aluminum | Frogs & Switches (Manganese) | Steel Castings (Low Carbon) |
| Billets | Malleable Castings (Annealed) | Steel Castings (Manganese) |
| Cast Iron | Welds (Carbon Alloy Steel) | |

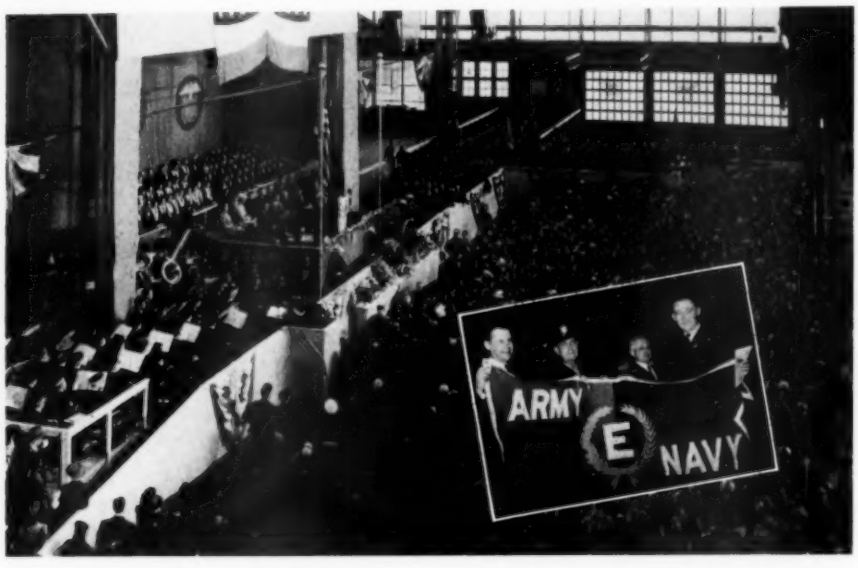
We are confident that once you use a Safety GRIP-LOK Wheel you'll specify them regularly.

## THE SAFETY GRINDING WHEEL AND MACHINE COMPANY

SPRINGFIELD, OHIO — SALES OFFICES IN PRINCIPAL CITIES — ESTABLISHED IN 1892

MANUFACTURERS OF SAFETY MOTOR DRIVEN PORTABLE GRINDERS, SAFETY RITE-SPEED GRINDERS, GRINDING WHEELS FOR EVERY PURPOSE, INCLUDING THE FAMOUS "SAFETY GRIP-LOK GRINDING WHEELS"

## Tractor Plant Receives Production Award




*An impressive ceremony before 25,000 persons marked presentation of the Army-Navy "E" to the 17,000 employes of Caterpillar Tractor Co., Peoria, Ill., March 12. Brig. Gen. David McCoach, assistant chief of Engineers and chief, Administration Division, Office of the Chief of Engineers, presented the "E" burgee. Capt. E. A. Lofquist, chief of staff, Ninth Naval District, presented token "E" pins to five employes "as symbols of their effort toward victory." L. B. Neumiller, president of Caterpillar, accepted the flag from General McCoach. Merritt Miles, 32-year-old automatic lathe operator, was chosen to respond to the presentation of the "E" pins, on behalf of his fellow employes. Shown holding the "E" flag are, left to right, Mr. Neumiller, General McCoach, Captain Lofquist and Mr. Miles*

(*Concluded from page* 132)
society states that in every foundry which has subscribed to the plan, the study and subsequent adjustment of their coke ratios alone has saved each plant several thousand dollars annually.

Both non-members and members of the society are eligible to obtain the service, but fees for the former will be higher than for members. Funds accruing from this service will be placed to the credit of the society.

## Sees Weakness in Manning Plan

Although details have been worked out to assist gray iron foundries to qualify under the Manning Table Plan, the scarcity of manpower in general tends to nullify the effectiveness of this procedure for replacement of personnel, according to W. W. Rose, executive vice president, Gray Iron Founders' Society Inc., in commenting on the plan.

It appears somewhat futile to arrange for an orderly replacement if the raw material with which to replace cannot be found, he points out, adding that if the United States Employment Service is unable to produce a replacer it should so certify and such certification should be accepted by selective service boards for exemption until such times as a replacement is forthcoming from the service and trained as per schedule.

The society co-operated with the War Manpower Commission in drawing up a nomenclature of jobs for the gray iron industry. These terminologies were incorporated in a questionnaire, sent to society members, asking for maximum and minimum estimates of time required to train a green man for each job and the number of men employed in such positions in each plant. Replies from the questionnaires were averaged for each job. After the averages were accepted by WMC, they were issued to foundries as official training time, together with a copy of the Manning Table Plan and a dictionary of the job terms employed, enabling them to qualify under the plan.

## "M" Pennant Won by Edward Valve

Edward Valve & Mfg. Co. Inc., East Chicago, Ind., received the U. S. Maritime Commission "M" pennant for excellence in production of cast and forged marine valves in ceremonies at its plant, March 13. The pennant, as well as a "Victory Fleet" flag, were presented by Thomas M. Woodward, Washington, a member of the commission, and were accepted by W. F. Crawford, company president. The "M" pennant is understood to be the first recognition of its kind to be accorded in the Greater Chicago area.

Mr. Woodward said that the company also manufactured valves for maritime ships during World War I.

*View of engineering conference dinner of National Engineering Co., held at Union League Club, Chicago, March 23*

HOURS
168 PER WEEK
FOR DURATION

REPRESENTATIVES
AND COMPLETE STOCKS
IN PRINCIPAL CITIES

# CERTIFIED CORE OIL & MFG. CO.

"The House of Dependability"

3308-26 SO CICERO AVENUE

CICERO · ILL.

All American Foundries
1943 Victory Road
Anywhere, U. S. A.

Dear Angus:

I ken th' corrre rrroom forrreman a' vurra big magneesium foundry - so unco big it pourrrs 500,000 pounds o' magneesium a month.

He showed me some cores for some of the many airplane castings they are pouring - a grand job of core-making if I ever saw one - as you can see for yourself from the small photograph. Many of the castings this foundry is making for our fighting planes are very complicated, large circular cores, lots of heavy sections, with deep pockets, sharp corners and thin sections tied in. The core makers in this plant have to be more than good, and the core oil must be just right for this kind of work.

Naturally, I was pleased when this foreman told me that they had put their core oil troubles behind them since they started using Certified core oil, which I prescribed a few months back.

Before magnesium was cast on a large scale, our laboratory had been working on this peculiar core oil problem, and when the war brought magnesium castings into their own we were ready for it with Certified Unique 539 Core Oil; keeping intact our reputation of having the proper core oil for every foundry need.

Whatever metals you are pouring, there is a Certified core oil which will give you the best results at the lowest ultimate cost - in the core room itself, in the cleaning department, and in smoother castings. Certified core oils are blended and sold and used by weight, which assures uniform performance.

Why not get a prescription from the Core Oil Doctor? 'Twill neither cost nor obligate you, and it will be the first step in saving money and eliminating core troubles. Just tell us fully about the shortcomings of your present core oil, your oil-to-sand ratio, type of sand used, oven heat employed and what other binder you use, if any.

Gude luck t'ye

Scotty Waugh

"The Core Oil Doctor"

CERTIFIED CORE OIL & MFG. CO.

"The House of Dependability"

3308-26 South Cicero Avenue, Cicero, Illinois

Stock and Representatives: Buffalo, N. Y. Elmira, N. Y. Worcester, Mass. Reading, Pa. Newark, N. J. St. Louis, Mo. New Orleans, La. Houston, Tex. Chattanooga, Tenn. Minneapolis, Minn. Portland, Ore.

# VOLCLAY BENTONITE

## NEWS LETTER

**REPORTING NEWS AND DEVELOPMENTS IN THE FOUNDRY USE OF BENTONITE**

### MOISTURE

Mr. Foundryman, these News Letters are for your information.
Did you know that high moisture causes:

(1) Blows
(2) Scabs
(3) Porosity
(4) Rough Finish
(5) Burn-ins
(6) Pinholes

High moisture gives false plasticity--Have you ever built a castle or fort at the swimming beach with only sand and water? They remain stanch while wet, but COLLAPSE on drying. The same is true in molds, they need a colloidal substance that will be strong when the moisture has been driven off, otherwise the sand will cut and wash. Volclay is "made to order" for just this purpose.

Use Volclay bentonite to avoid false plasticity and eliminate cuts, washes and cope drops.

High moisture may give good pattern draws and ram well, but are the castings smooth? Do you see any "craters" or "rough spots"?

★ ★ ★

Did you know?

When 1000 c.c. of water is heated from 0°C. to 100°C. it increases in volume approx. 43 c.c., whereas a block of steel the same size would expand only 3 c.c.?

A sq. ft. of sand 1/16" thick with 5% water produces about 2/3 cu. ft. of steam at 212°F. and 2½ cu. ft. at 2000°F.?

When water changes into steam it expands to 1600 times its volume?

A 400 lb. sand mold containing 3% water will erupt about 80 cu. ft. of steam when subjected to high heat?

These figures point out the disadvantages of high, or excess, moisture content.

When Volclay and Panther Creek bentonites are used as bonds, the minimum amount of moisture is required to furnish the satisfactory physical properties, thus avoiding defects due to high moisture.

*Produced by*

**AMERICAN COLLOID COMPANY**

**363 WEST SUPERIOR STREET • CHICAGO, ILLINOIS**

## Issues Emergency Specifications

In the interest of expediting procurement or conservation of materials during the National Emergency, the American Society for Testing Materials has issued a number of emergency alternate provisions in accordance with a special procedure. They are intended for use where they may be considered by the purchaser of the material as a permissible alternate for the specific application or use desired. The most recent alternates issued include the following:

**EA-A190**

The following Emergency Alternate Provisions, when specified, may be used as an alternate in A.S.T.M. Standard Specifications for Lightweight and Thin-Sectioned Gray Iron Castings (A190-40) and affect only the requirements referred to:

*Section* 1.—Change the last two sentences from their present form to read as follows:

Strength is not a primary consideration in the castings covered by these specifications, so all reference to classification by strength or to physical tests for strength is intentionally omitted. In those cases where some test is felt necessary to determine serviceability, such test should be made as provided in Section 3.

Omit the note which follows this section.

*Section* 3.—Change from its present form to read as follows:

3. *Physical Tests.*—On mutual agreement by the manufacturer and the purchaser, it is permissible to test castings in service and to test individual castings to destruction. The cost of such tests shall be borne by the purchaser. When such tests are mutually agreed upon, it is advisable that details thereof and provisions for acceptance and rejection be included in the order or purchase contract. Castings ordered to tensile strength or transverse strength requirements should be purchased in accordance with the Standard Specifications for Gray Iron Castings (A.S.T.M. Designation: A 48) of the American Society for Testing Materials.

*Section* 9.—Change from its present form to read as follows:

9. *Certification.*—Upon request of the purchaser, the manufacturer shall be prepared to certify that his product conforms to any physical test requirements or alloy analysis covered by these specifications.

**EA-B22**

The following Emergency Alternate Provisions, when specified, may be used as an alternate in A.S.T.M. Tentative Specifications for Bronze Castings for Turntables and Movable Bridges and for Bearing and Expansion Plates of Fixed Bridges (B 22-42T), and affect only the requirements referred to:

*Section* 2 (*a*)—Add a reference to the following specifications as covering an alternate grade of copper approved for use in the manufacture of bronze castings for turntables and bridges:

Emergency Specifications for Fire-Refined Copper for Wrought Products and Alloys (A.S.T.M. Designation: ES-7) of the American Society for Testing Materials.

**EA-B148a**

The following Emergency Alternate Provisions, when specified, may be used as an alternate in A.S.T.M. Tentative Specifications for Aluminum-Bronze Sand Castings (B 148-42 T) and affect only the requirements referred to:

*Section* 3 (*b*).—Add a reference to the following specifications as covering an alternate grade of copper approved for use in the manufacture of aluminum-bronze sand castings:

Emergency Specifications for Fire-Reefined Copper for Wrought Products and Alloys (A.S.T.M. Designation: ES-7) of the American Society for Testing Materials.

*Table III.*—Change the yield strength values for alloys 9A-1 and 9A-2 from their present form: namely,

| | Alloy 9A-1 (As Cast) | Alloy 9A-2 (As Cast) |
|---|---|---|
| Yield strength, min., psi. | 28,000 | 35,000 |

to read as follows:

| | Alloy 9A-1 (As Cast) | Alloy 9A-2 (As Cast) |
|---|---|---|
| Yield strength, min., psi. | 26,000 | 33,000 |

## Manual to Aid Fire Protection Work

National Fire Protection Association, 60 Batterymarch Street, Boston, has published a training manual designed to assist industrial fire brigades in plant protection. It provides information for training employes in fire fighting duties; serves as a reference book in plants where a fire brigade already is organized, and assists plants which require essential data but not the details of a large plant fire protection organization.

## Recent Recipients of Army-Navy "E"

Production records of the following foundries and foundry equipment and supply manufacturers have been recognized by the Army and Navy departments by recent award of the coveted Army-Navy "E":

Allis-Chalmers Mfg. Co., Milwaukee; American Foundry Equipment Co., Mishawaka, Ind.; American Laundry Machinery Co., Cincinnati; Baldwin Locomotive Works, Eddystone, Pa.; Clark Tructractor Division, Clark Equipment Co., Battle Creek, Mich.; Eclipse Lawnmower Co., Prophetstown, Ill.; Exeter Brass Works, Exeter, N. H.; Foxboro Co., Foxboro, Mass.; General Electric Co., Erie, Pa.; Glamorgan Pipe & Foundry Co., Lynchburg, Va.; Hammond Brass Works, Hammond, Ind.; Harrison Radiator Division, General Motors Corp., Lockport, N. Y.; Kensington Steel Co., Chicago; Lehigh Foundries Inc., Easton, Pa.; Manning, Maxwell & Moore Co., Bridgeport, Conn., and Boston; Pangborn Corp., Hagerstown, Md.; William Powell Co., Cincinnati; Robbins & Myers Inc., Springfield, O.; George D. Roper Corp., Rockford, Ill.; Sivyer Steel Castings Co., Milwaukee; Truscon Steel Co., division of Republic Steel Corp., Youngstown, O.; Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.; Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.; Wheland Co., Chattanooga, Tenn.; Whiting Corp., Harvey, Ill.; Wollaston Foundry Inc., North Quincy, Mass.

## Storage Bins Are of Special Design

*Bins specifically designed for storing scrap and other materials at the new Midwest plant of Walworth Co. have slanted doorways located at one corner of each bin. Corners are cut off diagonally, the doorways forming a "V" into which a loading truck can back easily from the narrow roadway. The corner doorways also take advantage of the tendency of material deposited from overhead to form conically and leave waste space in a square bin. The 19 concrete bins parallel the foundry and are served by an overhead crane. Covers are available to protect the bin contents when not overfilled. Rust Engineering Co., Pittsburgh, and the plant operating engineers are responsible for the design*

# WASHINGTON NOTES ★ ★ ★ ★

NO WHOLESALE resumption or marked increase in production of civilian goods appears in prospect, despite the trend in that direction lately. Manufacturers of about 20 civilian products, many of them not essential, recently were permitted to use up stocks of partially or wholly fabricated steel parts—about 3000 tons—previously frozen by WPB. However, the material is light gage and not suitable for war production or scrap purposes, and manufacturing is restricted to "loose" labor market areas.

• • •

*At the same time, some observers hold that industry can produce more weapons than can be delivered and used at the fighting fronts and that this will result in relaxation of curbs on output of certain civilian goods before the end of the year, particularly where it has been demonstrated the original restrictions were too severe. Limitations on the manufacture of cast iron soil pipe will not be eased, it was emphasized by WPB at a recent meeting of the industry's advisory committee.*

• • •

England's experience with absenteeism in war plants indicates that the length of the working week is an important factor in unauthorized layoffs. British surveys show that time lost during a 70 to 75-hour week, such as was worked after Dunkirk, was 3 to 4 per cent higher than during a 47-hour week. For a 60 to 65-hour week there was a 1 to 2 per cent increase. The absentee record for a 47-hour week was 7.1 per cent, with 3.7 per cent consisting of unauthorized absences.

• • •

*Maximum prices for aluminum sold by primary producers in pig form have been set by OPA at levels 1 cent per pound below prices of the corresponding ingots. This ruling, effective March 30, was made through Order 353 under the General Maximum Price Regulation.*

• • •

Shoe rationing regulations have been amended to facilitate acquisition of safety shoes by plant workers. Employers will be authorized by OPA to issue purchase certificates for safety shoes to any employe who has spent his ration stamp 17. Employers may obtain a supply of such certificates by applying to the OPA district office serving their area. A worker must have spent his own stamp 17 to be able to use this alternate procedure to obtain safety shoes.

• • •

*Calcium metal has been placed under allocation by WPB through Order M-303. A buyer seeking delivery in any month beginning with May, whether for his own use or resale, must file application with WPB and his supplier on Form PD-600 by the 15th of the preceding month. Producers and distributors are requested to file PD-601 with WPB by the 20th of each month.*

• • •

Used machinery and machine parts now may be sold at maximum prices arrived at by either of two methods. Formerly the ceiling was 85 per cent of the maximum for the nearest new equivalent machine or part—provided the used unit was reconditioned and guaranteed; in the "as is" condition the ceiling was 55 per cent. This formula still may be used, but an amendment to MPR 136, effective April 5, permits the seller to use an alternate formula. The latter takes the maximum for the nearest new equivalent machine and reduces the price by a depreciation rate specified in the regulation. For "foundry machinery" the depreciation rate per annum is 5 per cent. When using this latter method sellers must furnish the buyer with a signed statement showing the name and address of the person who bought the machine when new and the date of sale. This revision is expected to result in higher prices for used machinery in some instances.

• • •

*Inflated prices on used motor trucks, in some cases far above the price of the vehicle when new, have been scaled down by OPA under a regulation which establishes ceilings at varying percentages of the truck's original price, depending on its age.*

• • •

Maximum prices for ingots and linked ingots of primary lead that were reduced $5 a ton by OPA, effective Jan. 20, have been restored to their former level of $10 a ton over the maximum price for pig lead, effective April 3. The reduced price was found to be insufficient to cover cost of production.

• • •

*Brass and bronze alloy shot has been added to the maximum price regulation covering brass and bronze alloy ingot—No. 202. Formerly it was priced under the General Maximum Price Regulation. Effective April 12, the procedure for establishing ceiling prices for shot is similar to that for pricing special alloy ingots and will bring the maximums in line with those for brass and bronze alloy ingot after making allowances for differences in manufacturing costs of shot and ingot. Producers must file prices with OPA for approval.*

• • •

Regulations covering OPA prices of gray iron castings (MPR 244) have been changed in several respects by Amendment 4. A revision of the definition of "gray iron castings" specifies that it does not apply to castings sold in an assembly with other materials (except fastenings such as bolts, screws, etc.). Also exempt are boiler conversion parts (priced under MPR 236) and castings sold by a company which merely machines them and which has no gray iron foundry of its own.

• • •

*A fourth exemption to MPR 244 are castings sold as another commodity by a manufacturer regularly making such other commodity. Pursuing the usual labyrinth of OPA definitions, a "regular manufacturer of another commodity" is defined as one who (a) circulates catalogues, price lists or other advertising matter in the trade and thereby professes to be such a manufacturer, and who (b) also owns the patterns used to make the commodity, and who (c) customarily makes for, and sells such commodity from, stock.*

• • •

After setting up the above specifications for the so-called "regular manufacturer" under MPR 244, OPA then proceeds to tear them down and set up new ones by stating that the seller of castings who does not meet all the requirements may still be considered "regular" if he is recognized in the trade as a source of supply of such other commodity and applies to OPA for a determination. This determination also may be made by OPA without an application. OPA says the new definition will enable sellers to determine "easily" whether their castings should be priced under MPR 244 or under some other regulation. Similar definitions have been set up under MPR 241—malleable iron castings, effective April 15.

• • •

*Other changes in MPR 244: a seller seeking price adjustment must not use the requested prices pending the decision on his application if he is not selling such castings under government contracts or subcontracts, unless OPA first approves, but if the castings are for government contracts or subcontracts the requested prices may be used without OPA consent and subsequently adjusted if necessary when OPA makes its decision; sellers who were not selling castings on Feb. 1, 1942, should file Form 344:2 with OPA for approval of a proposed pricing method; sellers operating more than one foundry must treat each foundry as a separate seller in their price determinations.*

• • •

The present serious shortage of calcium carbide, necessary in generating acetylene, will continue for several months as a result of unavoidable delays in operation of new facilities, according to advice to the Oxygen and Acetylene Industry Advisory Committee of WPB.

• • •

*Producers of rolled and cast alloy steel (except stainless and tool steel) now are required to use alloy steel turnings in an amount not less than 8 per cent, including machine shop turnings in an amount not less than 4 per cent, of the total weight of alloy steel ingots and castings pro-*

(*Continued on page 140*)

# Laugh this off, Yamamoto!

Each flawless casting that comes from America's foundries is helping speed the day, Admiral Yamamoto, when you'll plunge a hara-kiri knife into your yellow belly...and there's nothing you can do about it.

Perhaps your spies have reported that Penolyn Core Oil is increasing the number of perfect cores and perfect castings. There's nothing you can do about that either, Yammy. Quick baking, fast cleaning, Penolyn minimizes gas-forming tendencies and reduces rejects. And Penola's engineers are always on call to help solve America's casting problems. Better sharpen up that knife right now, Yamamoto.

PITTSBURGH, PA.

Penola
Reg. U. S. Pat. Off.

NEW YORK
CHICAGO
DETROIT
ST. LOUIS

(*Continued from Page* 138)

*duced each month. This provision is incorporated in Order M-21-a as amended by WPB. Greater scrap use in production of stainless steel castings is necessitated by regulations limiting the extent of chromium content which may be derived from ferrochrome.*

• • •

More than 50 government and privately owned arsenals and war plants have availed themselves of the services of the Dermatoses Investigation Section of the U. S. Public Health Service, Washington, since start of the war. DI gets reports on skin disease outbreaks when doctors are baffled, and goes to work until the causes are unearthed.

• • •

*Steel annealing boxes are classed by OPA as unprepared No. 1 heavy melting steel and are priced at $3.50 per gross ton below the maximum price of No. 1 heavy melting, according to a recent ruling. Cast or malleable iron annealing boxes are classed as unprepared cast iron and are priced at $2.50 a ton below No. 1 cupola cast, the same price as heavy breakable cast.*

• • •

WPB has made nearly 75,000 investigations of companies in checking compliance with its regulations. These resulted in only 247 suspension orders and 59 criminal prosecutions. One of the latter cases ended in a prison sentence. Many of the cases revealed violations of a technical nature which had not impeded the war effort. Most suspension orders followed violations of the construction order, L-41.

• • •

*Scrap and secondary aluminum price schedule No. 2 has been revised by OPA, effective March 31, to permit secondary smelters in strictly defined instances to pay baling and briquetting premiums to three grades of plant scrap—17S, 24S and 52S—and to add ½-cent a pound to their ceilings for ingot made from the scrap.*

• • •

A studied attempt to simplify government questionnaires and eliminate unnecessary duplications of forms is being made by various government agencies which have set up internal control units to work on this subject. Included among the departments which have established such units are WPB, OPA, WMC, Department of Commerce, War and Navy.

• • •

*Controlled Materials Plan has run into one of the snags that was encountered by PRP. This is the placing by some consumers of more than one order for the controlled materials allotted them. This duplication of orders, even though the buyer intends to cancel all but one of them after he has been assured delivery, is a violation of CMP Regulation No. 1, and WPB is trying to squelch the practice before mill schedules become distorted as a result of the practice.*

• • •

OPA has ruled that the 3 per cent federal transportation tax may be added to the maximum price which may be charged the purchaser of pig iron, and that the seller must absorb any tax payments in excess of the tax applicable to freight from the governing basing point to the place of delivery. Where it has been customary in certain switching districts to add a flat delivery rate and absorb freight increases, the transportation tax on the switching charge must be absorbed by the seller.

• • •

*It is unlawful for a buyer to pay a fee, in addition to the maximum price, to a finder of steel products covered by the producers' or warehouses' price schedule, according to an OPA interpretation. The reasoning is that the government has set up adequate agencies for locating steel inventories, and that no useful function is performed by such finders.*

• • •

Efforts to conserve supplies of critical metals — especially nickel, chromium, molybdenum and vanadium—may lead to standardization or simplification of alloying formulas employed in iron and steel foundry practice. The subject has been under study by a sub-group of the Ferrous Foundry Industry Advisory Committee of WPB.

• • •

*Increase in the time required for transit of railroad freight shipments amounts in some cases to as much as 50 per cent compared with last summer. This has had the effect of cutting the box car supply by more than 4 per cent and of reducing the open-top car fleet by nearly 7 per cent. ODT has discovered that the requirement of heavier loading of less-carload freight does not increase the box car supply as much as was assumed.*

• • •

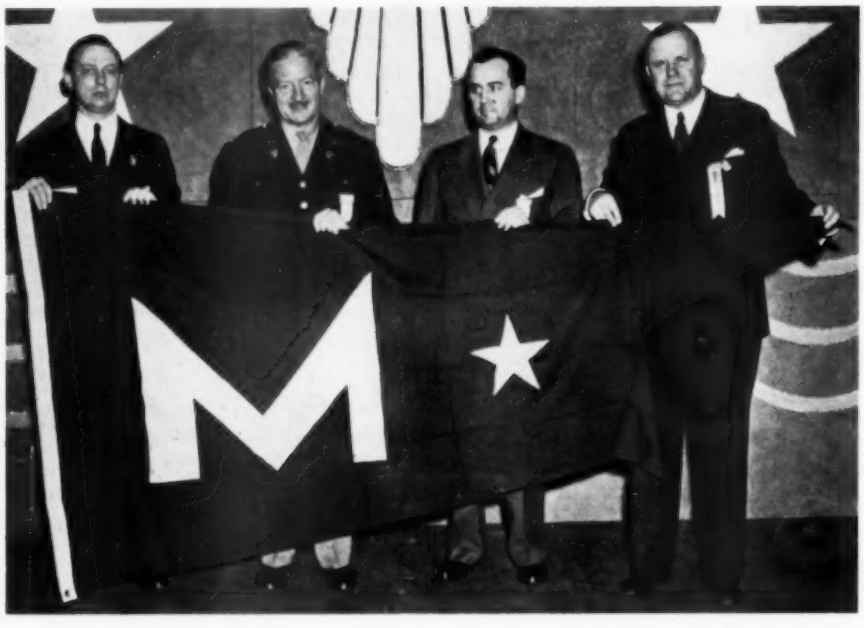
Steel foundries now are permitted by OPA to sell castings in shipments of less than 100 pounds f.o.b. the foundry, instead of delivered. They also may add all transportation costs above 50 cents per 100 pounds to their maximum prices. This change from former practice, incorporated in Amendment to RPS 41, was effective March 28 and was accompanied by cuts in price ceilings of about 25 per cent on castings for tanks and cast armor for the Navy. This lowered maximums to going levels and did not reduce actual selling prices. Another change rescinded price reductions made Feb. 26 on miscellaneous marine castings; the February cuts pushed prices so low they discouraged production. Steel castings having an estimated cost per order of less than $100 were exempted from price control by the same amendment.

• • •

*Workers are provided higher preference rating in obtaining new precision measuring hand tools needed in their employment, under terms of a new order, E-5-a, issued by WPB. Hereafter such workers may use the same rating as is assigned under CMP to their employers for maintenance, repair and operating supplies. Such rating must be AA-2X or higher and accompanied by a certification of the worker and his employer that the tool is required and that no other similar tool is available for the work.*

W. G. G.

## Wins Maritime Commission "M" Pennant



*For outstanding production for the war effort, Mine Safety Appliances Co., Pittsburgh, recently was awarded the Maritime "M" Pennant and Victory Fleet Flag by the United States Maritime Commission. Merit pins were presented to all company employes. Displaying the pennant are, left to right: John T. Ryan Jr., general manager; Col. Willard F. Rockwell, director of production, emergency ship program, United States Maritime Commission; Charles E. Walsh Jr., director of procurement, United States Maritime Commission; and George H. Deike, president of the company*

In the march of production for war, now one material and now another is threatened with exhaustion. Some alternative material must help to keep up the pace.

FERRO-BORON is a timely metallurgical recruit. Scarcer elements, like molybdenum, chromium, and nickel can be employed more sparingly in the manufacture of high-grade irons and steels, if Boron is judiciously added. Very small percentages improve hardenability and strength to a marked degree.

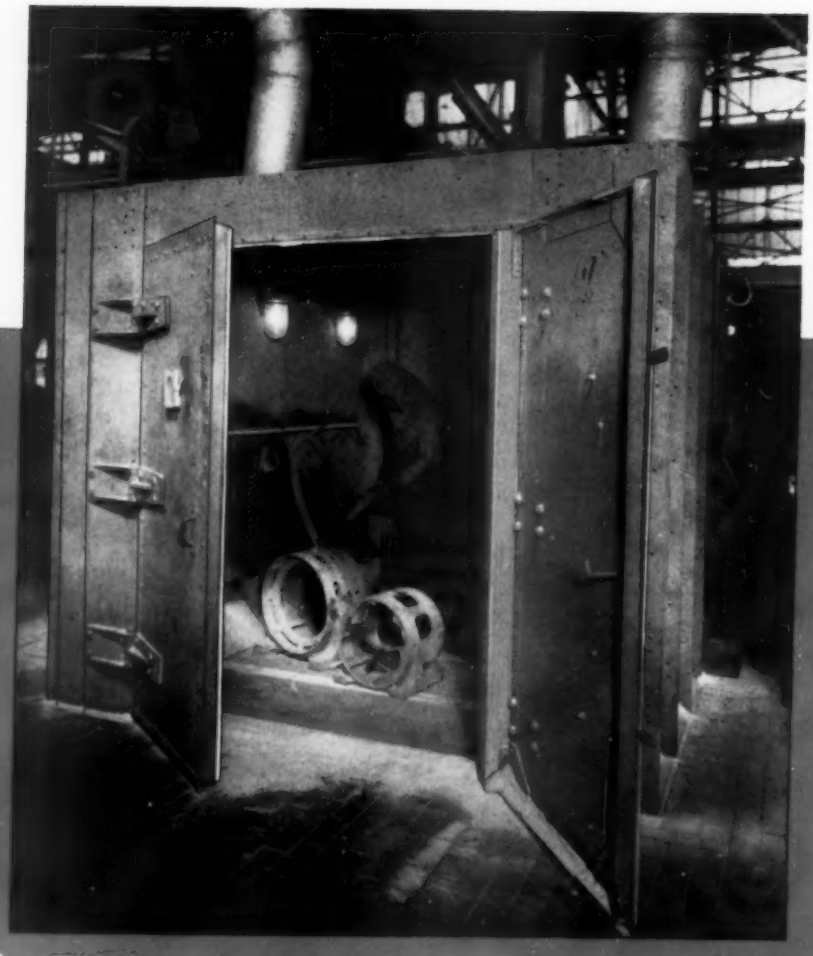
A special ferro-boron with a low melting point, which dissolves readily in cast iron or steel, and the boron recovery from which is very high, has been developed by the Molybdenum Corporation. Leading steel companies are using it with uniform success and at minimum cost for material. Standard procedures are followed.

Ferro-Boron is available for all requirements. Literature is offered. Inquiries concerning any use of Boron, Molybdenum, or Tungsten will be welcomed.

AMERICAN Production, American Distribution,
American Control—Completely Integrated.
Offices: Pittsburgh, New York, Chicago, Detroit, Los Angeles, San Francisco, Seattle.
Sales Representatives: Edgar L. Fink, Detroit; H. C. Donaldson & Co., Los Angeles, San Francisco, Seattle.

**MOLYBDENUM** CORPORATION OF AMERICA
GRANT BUILDING PITTSBURGH, PA.

MCA



# SLY BLAST ROOMS

Are used for cleaning Armor Plate and Castings for Jeeps, Tanks and Tankers, Battleships, Planes and Guns, Bombs, Trucks and Tractors, and virtually all types of Armament.

Handy Condensed Catalog of Sly Equipment just off the press. Write for copy.

**THE W. W. SLY MANUFACTURING CO.**

4753 Train Avenue Cleveland, Ohio

TUMBLING MILLS

SLY
INDUSTRIAL DUST CONTROL

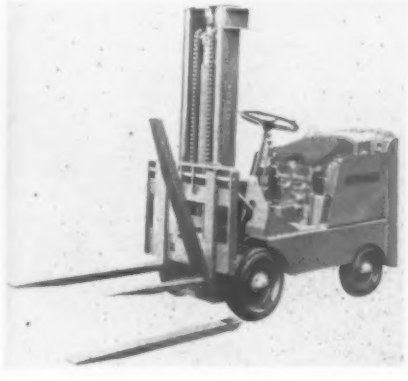
BLAST CLEANING EQUIPMENT

## Drum Lift

Ernst Carrier Sales Co., 1456 Jefferson Avenue, Buffalo, has developed a new carrier for placing and removing 55-gallon drums on and off skids, scales and platforms. It has a capacity of 700 pounds and a maximum lift of 14 inches. Built-in brake provides smooth lowering of the container. Operator is not required to touch the container.

## Fork Extension

Towmotor Corp., 1226 East 152nd Street, Cleveland, has developed a fork extension to facilitate handling loads of widely varying dimensions on a lift truck equipped with standard length forks. The



device, quickly and easily attached as shown in the accompanying illustration, extends the fork lengths safely up to 24 inches. While the device is held vertically, the eye at the bottom is inserted over the fork member. The extension then is slid back to the bend of the fork and lowered, where it is automatically locked in position. Side flanges prevent any slip in that direction.

## Helmet

H. Apelt Importing & Trading Co. Inc., 155 John street, New York, announces a fiber safety helmet, in white, black or olive drab, for men and women engaged in civilian defense, guard duty, war work, mining or other occupations where head protection is necessary. Approved by the coal mining section, Pennsylvania Compensation & Inspection Bureau, the helmet has a reinforced crown that is said to withstand impact of an 8-pound ball dropped from a height of 5 feet, a flexible brim and is fitted with shock absorbing material. Weight is less than half that of a metal helmet. It is made of water proof material.

## Liquid Coating

Midland Paint & Varnish Co., 9115 Reno Avenue, Cleveland, has developed a liquid coating designed to prevent adhesion of welding spatter. The liquid is brushed over the seam and the area where spatter may fall. After welding, the spatter may be wiped away without chipping or grinding. It is further claimed that the material fuses with the molten metal and maintains maximum tensile strength by floating off impurities, prevents porosity and stabilizes arc to minimize rod spatter and save rod metal. Manufacturer states the material is an adequate rust protector, will not freeze and may be used over the full welding range of amperage and voltage.

## Chip Breaker Charts

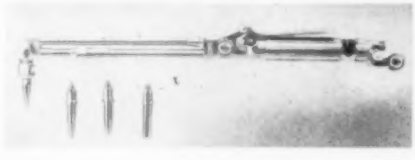
McKenna Metals Co., 131 Lloyd Ave., Latrobe, Pa., has prepared chip breaker charts available on request to metal machining plants using carbide tools. These wall charts, printed in three colors, present dimensional diagrams for the correct grinding of parallel, angular and groove type chip breakers. The charts show photographs of three chip breaker types and the kind of chips which will result from the use of each type of breaker. In addition to precautionary instructions on chip breaker grinding, the charts project chip breaker dimensions for all three types in relation to depth of cut and feed of the operation to be made.

## Reset Timers

R. W. Cramer Co., Centerbrook, Conn., announces that two new synchronous motor driven timers of the reset type now are available for time ranges up to 5 hours and longer. One timer has a double throw switch and opens or closes the circuit and starts by pressing and then releasing the start button, which also resets the timer. The other model is mechanically held in neutral position when the button is depressed and starts by pulling the start button outwardly. The timers operate a single pole, double throw switch with a capacity of 10 amperes at 115 volts, or 5 amperes at 220 volts, alternating current noninductive load. They will control a 1/3-horsepower load, a heater load up to 1200 watts, a lamp load of up to 250 watts or a relay load which does not exceed 15 amperes inrush at 115 volts alternating current. Both models are encased in attractive black bakelite designed for flush panel mounting. They can be supplied in dust or moisture-proof surface mounting steel housings, in explosion-proof cases, arranged for conduit connections, also with built-in visual or audible signals.

## Cutting Torch

National Cylinder Gas Co., 207 West Wacker Drive, Chicago, is offering a cutting torch incorporating a new mixing principle which provides quick preheat-



ing, and an oversize high pressure oxygen passage which permits unrestricted flow of cutting stream. Diaphragm which replaces packing ordinarily used is said to make the high pressure oxygen valve leak-proof. Oxygen and acetylene needle valves are stainless steel. Four series of tips are used. A new cutting attachment available for the company's standard torches has the same operating and construction features as the new model torch.

## Insulating Materials

Armstrong Cork Co., Lancaster, Pa., is marketing three types of diatomaceous earth insulating materials to be used in conjunction with insulating fire brick. One type is calcined insulating aggregate with a conductivity of 1.5 b.t.u. per square foot per hour; another is coarse grade insulation with a conductivity of 0.95 b.t.u. per square foot per hour, and powder insulation with a conductivity of 0.8 b.t.u. per square foot per hour. Powder type and coarse grade insulation principally are employed as fill type insulating materials, the powder being used where it can be tamped into place, and the coarse grade where tamping is impractical. Both serve between a refractory lining and the steel shell of jacketed equipment. Calcined

aggregate is used most widely in insulating concrete, and mixed with portland or aluminous cement. Powder and coarse material will withstand temperatures up to 1600 degrees Fahr., calcined material up to 2100 degrees Fahr.

## Revolving Dryer

I. R. Christie Co., 17 East 42nd Street, New York, is offering a revolving, semi-direct heat dryer in which the heat or gas is passed through a small drum or enclosed chamber rigidly suspended inside of and revolving with a large outside cylinder. Material to be dried is placed in the space between the inside and the outside chambers. In this way no heat comes in contact with the outer shell, except as dry gases for picking up evaporated moisture. Surface of the inner chamber is specially designed to provide maximum heating surface area.

## Washing Compound

Berman Chemical Co., 361 Tenth street, Toledo, O., has developed a cleaning compound, shipped in dry powder form, for removing shop dirt and stains from factory windows. It also removes iron rust, lime deposit, soap oils, body grease and discolorations from shower rooms, floors and walls, wash bowls, toilets and fountains. Banishes obnoxious odors. Eliminates the use of acids or frequent scrubbing. The material is claimed to contain nothing harmful to the skin, clothing or drains and creates no fumes. It leaves the floor of shower rooms absolutely slip-proof, and minimizes conditions that breed and distribute athlete's foot, ringworm and other disease. Samples of the material are available on request.

## Fume Exhauster

Chelsea Fan & Blower Co. Inc., 1206 Grove street, Irvington, N. J., has developed an improved fume exhauster. Fumes, gases, dust, filings and grinding compounds do not come in contact with the motor. Centrifugal type blower wheel is made of steel ⅛-inch thick. Frame work is welded into a single unit with handles for carrying. Motor is 3 horsepower. Adapters are interchangeable and can be used for suction or blowing.

## Identification Stamps

Jas. H. Matthews & Co., 3942 Forbes Street, Pittsburgh, announces a complete line of inspection stamps for use with ordinary rubber stamp inks for marking on absorbent materials, or with special inks and acid etching fluid for marking metal parts. Range of sizes, styles and shapes covers every industrial requirement. Special etching ink in three grades can be supplied in 4-ounce bottles, pints, quarts or gallons. No. 21 is for etching ordinary steel or iron, aluminum, copper, zinc or brass. No. 22 is for high speed or alloy steels. No. 23 is for use on blued steel. A simple yet satisfactory ink pad for use with etching ink is a medium grit abrasive disk saturated with ink and set in a glass reservoir. Acid resisting felt can be supplied in 60 inch width and any desired length, or in disks 2 inches diameter to fit the standard glass reservoir. Stock thickness is ¼-inch, but other thicknesses from ⅛ to ⅝-inch can be furnished.

## Speed Controller

Reeves Pulley Co., Columbus, Ind., announces a new unit in its line of variable speed control equipment consisting of a standard variable speed transmission with built-in speed reducer.

The unit is available in two enclosed designs, horizontal or vertical, for a wide range of speeds and in capacities from 1 to 7½ horsepower. Designed for as compact mounting as possible, allowance has been made for overload in starting and for momentary peak loads. Shafts are mounted in heavy duty ball radial bearings. All rotating parts are splash lubricated. The unit may be equipped for individual motor drive by mounting it directly on a base above the transmission. The special base is universally adjustable to accommodate any standard motor of the correct horsepower. Connection between motor and constant speed shaft may be silent or roller chain and sprockets, multiple V-belts or pinion and gear.

## Dust Collector

Aget-Detroit Co., Book Building, Detroit, announces a new low-cost, self-contained, table type dust collector for use with one or more flexible shaft grinding, buffing, small band sanding and metal spraying operations. The new unit has a standard motor-driven dust collector mounted as an integral part of the table and connected to a down-draft funnel. Requires no connection with a centralized system or secondary dust collector. It is shipped completely assembled and ready for operation. The ¼-horsepower motor is available for any 60-cycle current and drives a multiple blade fan for the down draft, which sends the dust laden air through a series of grids and baffles. A hand operated shaker on top of the drum type filter permits periodic shake down. Floor space required is 35 x 35 inches; height to top of grille working level 37 inches; height of back stop 24 inches; overall height 61 inches.

## Extinguisher Case

American - LaFrance - Foamite Corp., Elmira, N. Y., has introduced a new inexpensive extinguisher case which reveals instantly any attempt to tamper with the extinguishers, and houses the units away from the reach of unauthorized persons. Made of tough cardboard stock, the case may be opened quickly by pulling a sealed string which breaks through a gummed paper strip. Painted on each case is information concerning the classes of fires on which extinguishers should and should not be used.

## Acetylene Generator

Adler Mfg. Co., 1440 North Fourth Street, Milwaukee, is marketing a portable high pressure acetylene generator in which it is claimed absolute automatic control is obtained through the displacement method. Instead of feeding rice carbide into the water, this system immerses the more economical lump carbide totally in the water. Resultant acetylene gas pressure forces the water into an outside chamber and immediately stops further development until the gas has been used. Then the process is repeated. Automatic control eliminates hand operation of pressure and safety valves. The generator can be used with any torch, high or low pressure, for cutting and welding, also for soldering without oxygen. Available in two convenient sizes, load capacity 12 and 25 pounds.

## Head Covering

Standard Safety Equipment Co., 232 West Ontario Street, Chicago, has redesigned its industrial head coverings for women. Four styles are offered, one being the visorless or snood type. Complete coverage of all the hair is provided by all styles, and solid or mesh top is available. Size adjustment is effected by elastic or short drawstrings. Colors are navy blue or ivory drill, with red, green, blue or white trim on the crown and visor. A trademark or safety slogan can be imprinted in any color.

## Hoisting Unit

Trackson Co., Milwaukee, is offering its heavy-duty pipe line machines for all kinds of heavy lifting service. Boom and load line drums are mounted on a caterpillar track-type tractor, operating mechanism being located on the side of the tractor opposite the boom, so as to obtain maximum lifting capacities. Power

(*Continued on page* 146)

# Why there is only One Man in this picture

## Or How to Make Your Employment Department Happy

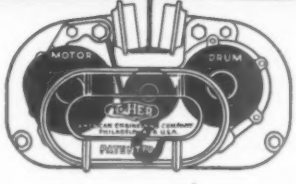
On page 3 in the current Lo-Hed Catalog and, in many earlier issues, you will find this brief statement: "Can be operated with one hand by one man". *That is a fact.* A Lo-Hed Hoist can be operated by one man with one hand, leaving the other hand free to guide the load. And that is the kind of hoist you need any place in your plant—wherever labor is scarce, wherever the time of men and women must be saved. Don't waste productive time and payroll on tiring, back-breaking, brute jobs. Let a Lo-Hed do the heavy lifting.

Write or telegraph for full information on a Lo-Hed Hoist.

### LO-HED IS THE "BALANCED" HOIST FOR HEAVY DUTY SERVICE

The *balanced* arrangement of motor and drum in a Lo-Hed Hoist allows the hook to be pulled up until it almost touches the beam—a desirable plus feature for which you pay no premium. This same arrangement makes possible the use of an all spur gear drive from motor to drum.

Other important features of the Lo-Hed Hoist are the heavy duty hoist motor; strong, short shafts; high duty bearings; 100% positive automatic stop; and removable protective covers for all vital parts.




***The Lo-Hed Hoist can be adapted for operation on any monorail system. There's a Balanced Lo-Hed Electric Hoist for Every Purpose.***

*Other A-E-CO Products:*
**TAYLOR STOKERS**
**MARINE DECK AUXILIARIES**
**HELE-SHAW FLUID POWER**

Æ CO 75th ANNIVERSARY

**AMERICAN ENGINEERING COMPANY**

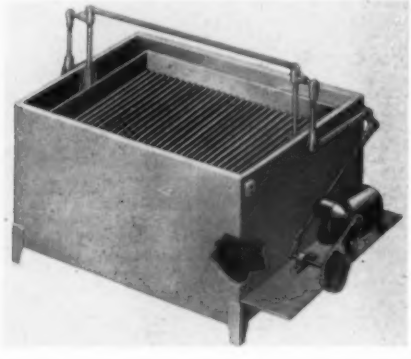
**2418 ARAMINGO AVENUE**
**PHILADELPHIA, PENNA.**

(*Continued from page* 144)

is from the rear power take-off of the tractor, and operation is independent of the tractor master clutch. Automotive type transmission gives four speeds forward and one in reverse for both boom and load line drums. Frame is all-welded box section structure, with provision made on its left side for quickly attaching up to 3500 pounds of segment counterweights. Lifting capacities of three different models range from 19,000 pounds to 28,000 pounds with 4-foot overhang and from 6500 pounds to 9000 pounds with 12-foot overhang.

## Metal Parts Washer

Sturdy-Bilt Equipment Corp., West Allis, Wis., announces an improved automatic unit for cleaning, washing and preparing small metal parts, castings, stampings, etc. "Swishing" action into and out of the solution provides a soak-



ing and washing action. Hot or cold solution may be used. The tank is fully insulated, and the cleaning solution is heated to 120 to 130 degrees in a short time by means of steam, electricity or gas, as desired. An electric motor operates the mechanism which automatically lowers and raises the material tray. The unit is furnished in three sizes, 36 x 24 inches, 48 x 36 and 60 x 48—all 36 inches deep—with capacities of 130, 265 and 450 gallons, respectively.

## Refractory Coating

Federal Refractories Corp., unit of United States Stoneware Co., Akron, O., has developed a protective refractory coating material for application on firebrick, insulating firebrick, and castable refractories in oil, gas, coal-fired and electric furnaces as well as in nonferrous melting furnaces. The material is a liquid and can be applied by brushing, spraying or dipping to hot or cold surfaces. It is said that the coating will withstand temperatures up to 3000 degrees Fahr., and will not crack, peel, blister or bloat. It becomes an integral part of the refractory to which it is applied, and resists flame erosion, reduces spalling and is unaffected by attack of slags, alkalies, acids and moisture. The material is available in small or large containers to meet requirements.

## Crane Cab Filter

Lintern Corp., Berea, O., announces a new Aire-Rectifier for protecting overhead crane operators from harmful dusts, vapors and gases. An arrangement of mechanical, activated carbon and electro-static (Westinghouse Precipitron) filters in a compact assembly completely treats all air entering the cab enclosure. Clear air enters the cab at the rate of one complete change per minute through a diffuser which prevents drafts. Mechanical cooling is provided to remove excessive heat, and for winter operation the filtered air is electrically heated. Filtering apparatus is removed easily for cleaning.

## Car Door Opener

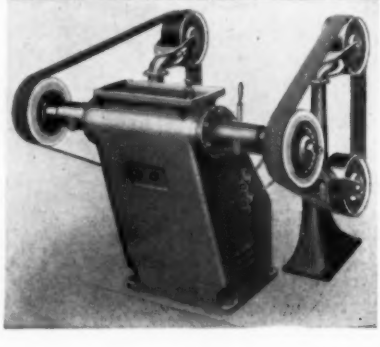
Industrial Products Co., 2820 North Fourth Street, Philadelphia, is offering a new tool which enables one man to open or close any box car door in a few seconds' time. The tool weighs 15 pounds and is said to be easy to handle but is built for rough handling.

## Emergency Lighting

Electric Storage Battery Co., 19th Street and Allegheny Avenue, Philadelphia, announces a new lighting unit designed to operate automatically when power failure extinguishes normal lighting in plants. It is also adapted for emergency lighting at control equipment; in boiler and engine rooms for reading gauges and operating valves; in plant gate house entrances and exits; first-aid stations and plant dispensaries. The unit includes a storage battery and a prefocused automotive type lamp which will illuminate 7500 square feet. Battery charging is automatic by trickle charge. Unit is self-contained, weighs 47 pounds and measures 16½ x 6¼ x 18 inches.

## Abrasive Belt Idler

Jones Engineering Co., Ellwood City, Pa., has developed a new abrasive belt backstand idler designed for crowded grinding and polishing departments. It can be connected quickly to any regular grinding or polishing lathe. It will take any belt size up to 6-inches wide, is designed for belt speeds up to 10,000 surface feet per minute, and is so built



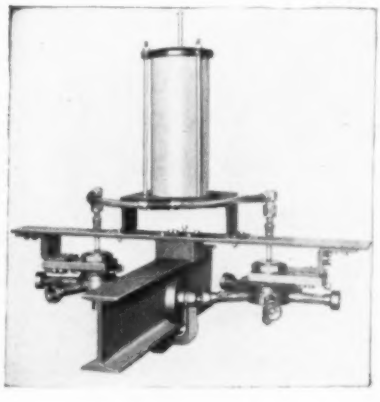
that simple dust collecting hoods can easily be installed. The idler takes a minimum of floor space, due to a vertical arrangement of pulleys.

## Welding Goggles

American Optical Co., Southbridge, Mass., has developed a new eye protection glass claimed to permit eyes of gas welders to pierce glare and see the complete welding operation. It is stated that the new glass lenses possess all the ray absorptive properties of the company's Noviweld glass plus the special characteristics of didymium, a combination of elements with high absorption in that particular portion of the visible spectrum where flux-flare normally obstructs clear vision. In all types of flame welding the new lenses cut down the high-intensity sodium rays of the fluxes. The lenses also absorb tiring, invisible ultraviolet and infra-red rays generated during welding. The lenses are available in three shades.

## Conveyor Lubricator

J. N. Fauver Co. Inc., 49 West Hancock, Detroit, has devised an automatic unit for applying lubricant to bearings of conveyor trolley wheels. It is said to be particularly useful where convey-



ors pass through kilns, ovens, dryers and other hot zones. The lubricator is mounted on the trolley rail. No independent power is required, travel of the conveyor operating the unit to lubricate each pair of wheels every time they pass the unit. Among claimed advantages are reduction of maintenance costs and less idle time while the conveyor is serviced. Lubricants ranging from oils to heavy greases may be used.

## Cable Connector

National Cylinder Gas Co., 207 West Wacker Drive, Chicago, announces new solderless connectors and lugs for welding cables which present many advantageous features. Soldering is entirely eliminated. Compression collar grips the cable end and shapes it into a head. The conductivity of fitting is greater than that of the cable. Fittings are ruggedly built

(*Continued on page* 148)

*Customers like these*

Aluminum Co. of America
American Magnesium Corp.
American Radiator & Standard Sanitary Corp.
Babcock & Wilcox Co.
Bridgeport Brass Co.
Bucyrus-Erie Co.
Brown Industries Corp.
Dunkirk Radiator Co.
Eclipse Aviation Division of Bendix Aviation Corp.
Electric Autolite Co.
Ford Motor Co.
Fox Furnace Co.
Fort Pitt Steel Casting Co.
Frank Foundries Corp.
Fremont Foundry Co.
G & C Foundry Co.
General Motors Corp.
General Electric Co.
Gilbert & Barker Co.
International Heater Co.
Packard Motor Co.
Shenango Penn Mold Co.
Studebaker Corp.
Whiten Machine Works
Whiting Corp.

A SALUTE TO

# CARL-MAYER

## CREATIVE ENGINEERING

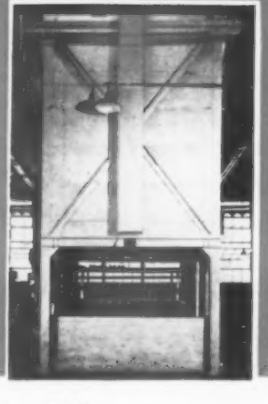
Carl-Mayer achievements in core baking and mold drying have received the best recognition of all—repeat order after repeat order from America's leading foundries—in face of wide competition. Investigate! You, too, will find it a wise move to consult Carl-Mayer when in the market for new or additional core and mold oven equipment.

**Carl-Mayer, 3030 Euclid Ave., Cleveland, O.**

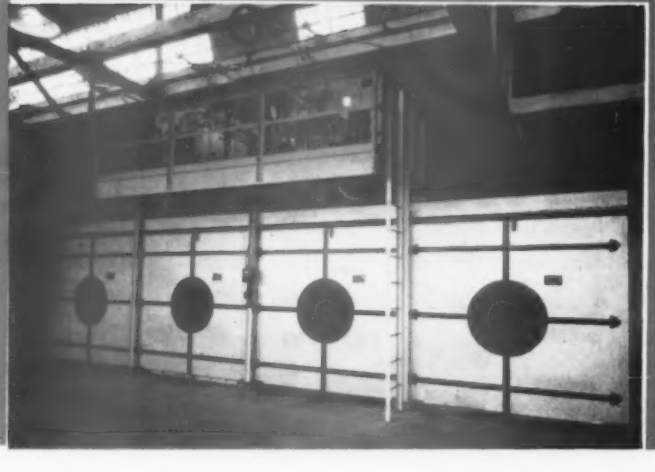
Three large Carl-Mayer Monorail Type Continuous Conveyor Core Ovens similar to this built for Ford airplane engine plant.

## CORE AND MOLD OVENS

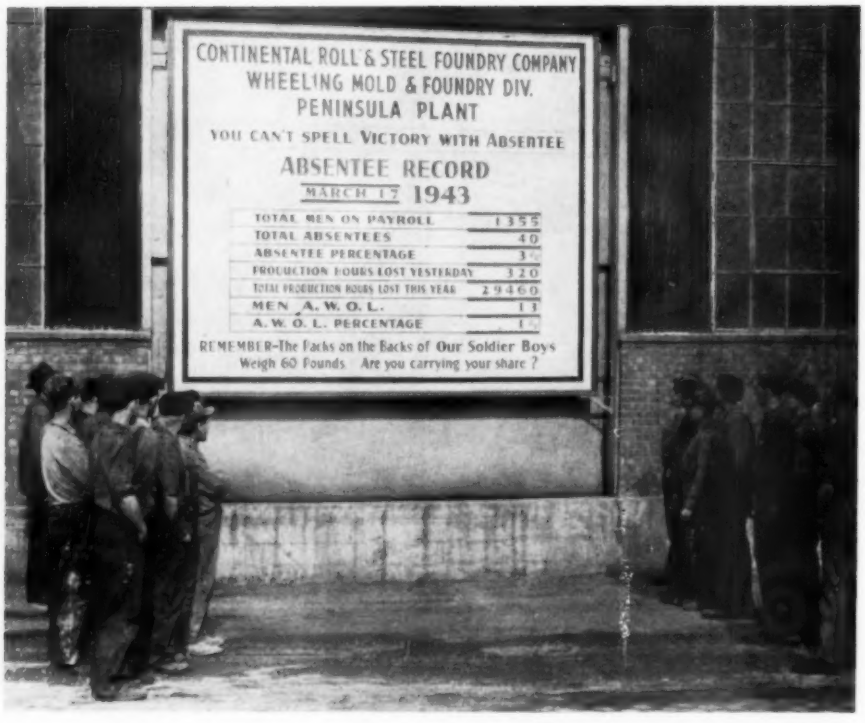
*All types All sizes*



One of several batteries of Carl-Mayer Oil Fired Recirculating Air Heater Type Core Ovens at American Magnesium Division of Aluminum Co. of America.



Typical Large Carl-Mayer Vertical Oven as installed for Electric Autolite, Fremont Foundry, Cadillac, General Motors and Packard Motor Co.


CONTINENTAL ROLL & STEEL FOUNDRY COMPANY
WHEELING MOLD & FOUNDRY DIV.
PENINSULA PLANT
YOU CAN'T SPELL VICTORY WITH ABSENTEE
ABSENTEE RECORD
MARCH 17 1943
TOTAL MEN ON PAYROLL 1355
TOTAL ABSENTEES 40
ABSENTEE PERCENTAGE 3%
PRODUCTION HOURS LOST YESTERDAY 320
TOTAL PRODUCTION HOURS LOST THIS YEAR 29460
MEN A. W. O. L. 13
A. W. O. L. PERCENTAGE 1%
REMEMBER-The Packs on the Backs of Our Soldier Boys
Weigh 60 Pounds Are you carrying your share ?

*One approach to the absenteeism problem, as followed by Continental Roll & Steel Foundry Co.'s Wheeling Mold & Foundry Division, is to publicize the plant's attendance record. The company has had an absentee percentage of about 4½ per cent, hopes to cut it to 2 or 2½ per cent. The "Red Ticket" illustrated is placed in the clock card rack (in front of regular time card), and is used only in cases when men are A.W.O.L. or whose reported reason for absence is considered not valid*

## Foundry Seeks Cure For Absenteeism

NO.

NAME .....

YOU WERE REPORTED ABSENT FROM WORK WITHOUT EXCUSE.

From ..... To .....

Date .....

CHECK YOUR REASON BELOW AND RETURN CARD TO EMPLOYMENT OFFICE.

Don't give a damn if we lose the WAR.

Pay Day "Blues"

Just Tired

Out too late

Over Slept

Sick

Sickness in family

Death in family

(*Concluded from page* 146)

to stand rough usage, and may be used repeatedly by replacement of compression ring. After initial installation cable lengths may be connected or disconnected by hand. The nut swivels so that cable is not twisted. Heavy duty insulation sleeve is bright red, held by soft rubber locks, assures safe operation and eliminates taping. Ease of connection and disconnecting makes it practical to switch cable lengths periodically to increase cable life.

### Sweeping Compound

Lacey-Webber Co., Kalamazoo, Mich., is offering a new floor cleaning compound said to eliminate the danger of fire usually inherent in materials sold for this purpose. It is also claimed to be highly absorbent of oils and grease. Marketed under the name Fibre-Tex, it is packed in 50-pound cartons and distributed through automotive, hardware, marine, mill and janitor supply wholesalers.

### Fire Extinguisher

O. H. Adams Co., 2018 East Thomas Ave., Milwaukee, announces a dry chemical fire extinguisher claimed to be effective against many types of fires, including automotive, airplane, industrial, marine, household, factory, gasoline, tar, cleaners, paint and grease fires. In service the end of the tube is opened and the enclosed powder is dusted over the fire. It is claimed one cubic inch of powder in contact with fire produces 1000 cubic inches of fire-smothering gas. The material will not deteriorate in storage and requires no servicing.

### Lens Protector

Carlhoff Co., 3050 Kensington Road, Cleveland, is marketing a new product designed to prevent fogging when applied to eye glasses, goggles, gas masks and windshields.

### Master Gage Blocks

Savage Tool Co., Savage, Minn., announces production of master gage blocks. A standard set, consisting of 81 individual blocks ranging in length from 0.050 to 4 inches, is made in three different grades. These have accuracies of 0.000002, 0.000004 and 0.000008 inch, respectively. Lapped surfaces permit the blocks to be wrung together in combinations giving practically any dimension in steps of 0.0001-inch from 0.10-inch to 12 inches. Precision optical measuring instruments, used in checking the accuracy of every gage block produced, are available to users for rechecking their gage blocks after they have been in use.

### Pattern Coating

T. J. Ronan Co. Inc., 749 West 135th street, New York, is marketing an alcohol soluble product for use on wooden patterns. A shellac replacement, it adheres readily to wood, dries rapidly, sands easily and comes ready for use. It is available in clear, red, black, yellow and green colors in quart, gallon, 5-gallon and 55-gallon containers.

### Air Power Stacker

Lewis-Shepard Sales Corp., 600 Walnut Street, Watertown, Mass., is featuring an air power stacker, a portable elevator for use in various hazardous operations. It is claimed that the device is safe, fast and efficient in all explosive atmospheres. The stacker will operate at the same pressure and volume as industrial overhead air hoists. Precise control is at the operator's finger tips. Any speed lifting or lowering between maximum and zero is instantly obtainable. A deadman cable-control stops the motor the instant the operator removes his hand from either of the dual holdover controls. The new stackers are produced in the same speeds and capacities as the standard line of electric stackers; also in standard hinged and telescopic types. Upper and lower limit stops automatically prevent over-ride lifting or lowering. The new stocking units may be used any place where compressed air is available.

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## Northern California

REGULAR monthly meeting of the Northern California Chapter of the A.F.A. was held March 12 at the Athens Club, Oakland. Total attendance was 70 members and guests. Chapter Chairman F. A. Mainzer, Pacific Brass Co. of San Francisco, and Vice Chairman Harry A. Bossi, H. C. Macauley Foundry, presided. The principal speaker, Albert G. Zima, International Nickel Co., and past chairman of the Southern California Chapter, was introduced by Program Chairman Serge P. Kovaleff.

Mr. Zima discussed cast irons, illustrating his subject with slides and with the use of a blackboard. The speaker outlined briefly the part alloyed cast irons have played during the past several years, and what has been done to control critical material. He pointed out possibilities of getting good results by following suggestions of those in authority who are constantly striving to keep up quality of products and yet conserve estimated supplies of raw material for the duration.—*George L. Kennard, secretary.*

## Twin City

MARCH meeting of the Twin City Chapter of the A.F.A. was held Monday, March 22, at the Midway Club, St. Paul. A record attendance for the year, 112, sat down to dinner. Those who had not made reservations were asked to contribute to the Red Cross, but before the meeting was over, everyone had contributed and the sum of $21.42 was turned over to the fund.

After dinner R. M. Aker, Western Alloyed Steel Castings Co., Minneapolis, and chairman of the chapter, called the meeting to order. Guests and those attending for the first time were introduced and welcomed. Several visitors from the Wisconsin chapter were present, and W. A. Hambley, Allis-Chalmers Mfg. Co., made a few brief remarks.

Officers for the ensuing year then were elected as follows: Chairman, R. W. Bingham, American Hoist & Derrick Co., St. Paul; vice chairman, C. H. Anderson, Crown Iron Works, Minneapolis; secretary-treasurer, A. S. Caswell, Minneapolis Civic and Commerce Association. Directors for three years: Fulton Holtby, University of Minnesota; Joe S. Garske, Progress Pattern & Foundry Co., St. Paul; and A. F. Carlstrom, Smith, Sharpe Co., Minneapolis.

Speaker for the evening was Pat Dwyer, engineering editor of THE FOUNDRY, Cleveland, who spoke on the subject, "Gates and Risers." The talk was most instructive and entertaining, interspersed with Pat's usual Irish wit and good stories.—*O. W. Potter, secretary-treasurer.*

## Wisconsin

DESPITE the worst storm of the winter, a surprisingly large attendance was present at the regular meeting of the Wisconsin Chapter of the A.F.A. held at Hotel Schroeder, Milwaukee, March 19. Those present were rewarded by one of the chapter's most interesting discussion meetings.

Chapter President George K. Dreher, Ampco Metal Inc., announced the following officers had been nominated for the coming year: George K. Dreher, president; Harry E. Ladwig, Allis-Chalmers Mfg. Co., vice president; R. F. Jordan, Sterling Wheelbarrow Co., treasurer; John Bing, A. P. Green Fire Brick Co., secretary. Directors nominated are: Oscar E. Woehlke, Grede Foundries Inc.; Paul E. Riedel, Production Pattern Co.; L. D. Harkrider, General Malleable Corp.; and R. J. Anderson, Belle City Malleable Iron Co.

The chapter's gray iron, malleable and pattern groups combined to hear E. T. Kindt, Jr., president, Kindt-Collins Co., Cleveland, discuss, "Patterns and their Relation to the Foundries." Mr. Kindt urged that pattern groups throughout the country take immediate steps for united action in impressing upon the War Production Board the acute situation confronting patternmakers in their inability to obtain restricted material for essential pattern work. He described scientifically cast pattern plates and showed an educational film illustrating his subject. Frank L. Waldenmeyer, A. J. Lindemann & Hoverson Co., L. D. Harkrider, General Malleable Corp., G. F. Smitka, Ampco Metal Inc., and Walter Schmitt, Falk Corp., served as chairmen and leaders of the discussion that followed.

Joseph A. Gitzen, president, Delta Oil Products Co., Milwaukee, covered a wide range of core room practices in his talk, "Core Sand Binders, Their Uses and Properties," before the nonferrous group. He described not only the proper use of binders, but also gave an analysis of core washes. Because many of those present are engaged in experiments with magnesium alloys, for aircraft parts, the speaker was besieged with a flood of questions. In the course of the discussion, Mr. Gitzen explained it had been found that the finer grain core sands have proved more satisfactory, and he recommended bank sands rather than silica sands for that type of work. Walter Edens, Ampco Metal Inc., and A. K. Higgins, Allis-Chalmers Mfg. Co. served as chairmen of the group.

Steel section, under the leadership of Carl Haertel, Falk Corp., James J. Ewens, Milwaukee Steel Foundry, Fred A. Pritzlaff, Falk Corp., Paul C. Power, Maynard Electric Steel Castings Co., and David Zuege, Sivyer Steel Casting Co., discussed topics which highlighted the recent regional foundry conference conducted by the Wisconsin Chapter.—*George M. Pendergast, publicity chairman.*

## Pittsburgh

MARCH meeting of the Pittsburgh Foundrymen's association was devoted jointly to a tribute to T. A. Reynolds and to nonferrous foundry practice. Mr. Reynolds, president of the association in 1932 and 1933 and for the past 10 years a member of the executive committee, has retired as superintendent of the McConway & Torley Corp. following 30 years' service.

His experience with the foundry business began in 1892 with the Westinghouse Electric & Mfg. Co. Subsequently he was with Speakman & McLarren, the Pittsburgh Locomotive Works, Lawrenceville Bronze Co., McGill Machine Co., Brush & Stevens and Pennsylvania Malleable Iron Co., joining McConway & Torley in 1913. C. J. Scheckhaus, past president of the association, outlined Mr. Reynolds' career on the occasion of his retirement and paid a fitting tribute to his untiring efforts on behalf of the Pittsburgh Foundrymen's Association.

As speaker of the evening, J. N. Kelly, Linhart nonferrous foundry, Westinghouse Electric & Mfg. Co., spoke on the production of Navy bronze castings in the nonferrous foundry. Mr. Kelly cited the importance of proper procedure for making test bars and outlined several methods which have been found satis-

(*Continued on page* 152)

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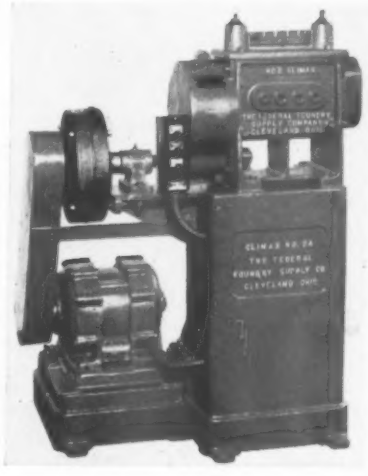

You needn't use core wire in large quantities to profit by straightening and re-using them. In fact the savings resulting from this practice might be more important in a small or medium foundry than in a large one.

Whether your shop is large or small, you'll find the Climax Wire Straightener will soon pay for itself.

The Climax is offered in three models, each of which will straighten a variety of wire sizes. The motorized model 2-A (shown above) will straighten 350 pounds of ¼-inch wire per hour with unskilled labor—yet is priced within the reach of even the smallest of foundries.

Write today for circular and quotation.

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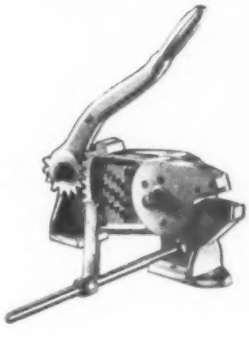

More and more foundries are recognizing the usefulness of this compact cutter. The Wonder Cutter is inexpensive, can be mounted on any bench, wherever handy, and will cut wires and rods up to ⅝" round and band iron up to ⅛" x 2". A convenient gauge makes it easy to cut countless pieces to the same length. Deliveries are prompt—the price $39.50 f.o.b. Cleveland.

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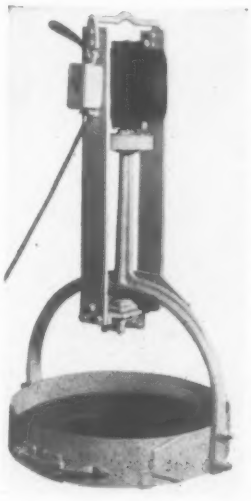

Users of the Lowe Sifter find that faster sifting pays dividends. The Lowe is designed to sift sand faster than a man can shovel it. Molders like Lowe-sifted sand, too, for it's thoroughly aerated and easier to handle. Whether you use the Lowe for facing, core or molding sands, it always does a better job.

The Lowe Sifter can be operated from any light socket, is portable and can be suspended from any convenient hook. Excellent deliveries on 110 volt models.

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ACME PATTERN & TOOL COMPANY, Inc., DAYTON, OHIO
Heat-Treated Aluminum Aircraft Castings—Patterns —Tools—Tool Designing—Production Processing

(*Continued from page* 150)

factory. Methods used in preparing the more prominent Navy bronzes in the Westinghouse foundry were detailed by the speaker, paying particular attention to methods of gating and risering. Physical properties arising from slight variations in analyses were outlined by Mr. Kelly in giving the result of intensive research carried out in his shop..

A "How-To-Do-It" film was presented by the Aluminum Co. of America on the machining of aluminum.—*R. L. Hartford, secretary.*

## Reading

REGULAR meeting of the Reading Foundrymen's Association was held at the Berkshire Hotel, Reading Pa., March 16, with 150 members and guests in attendance.

Herman P. Good, president of the association introduced Dr. Allen Arthur Stockdale, speaker, whose subject was, "Soldiers of Production". The latter pointed out that America today is producing slightly more war goods than Germany, Italy and Japan combined. The American philosophy of production is training and skill; and the ability to reorganize and retrain employes to fulfill the tasks that confront the nation today. Relating personal observations made on a tour from coast to coast within the past several months, Dr. Stockdale cited a rally held by employes of a Midwestern plant, 10,000 strong and representing 42 nationalities. "There were no 'isms' in that group", he said, "they were to intent upon producing to the maximum of their ability, and they are made of the same stuff that has made this glorious nation what it is today." *H. C. Cummings, secretary.*

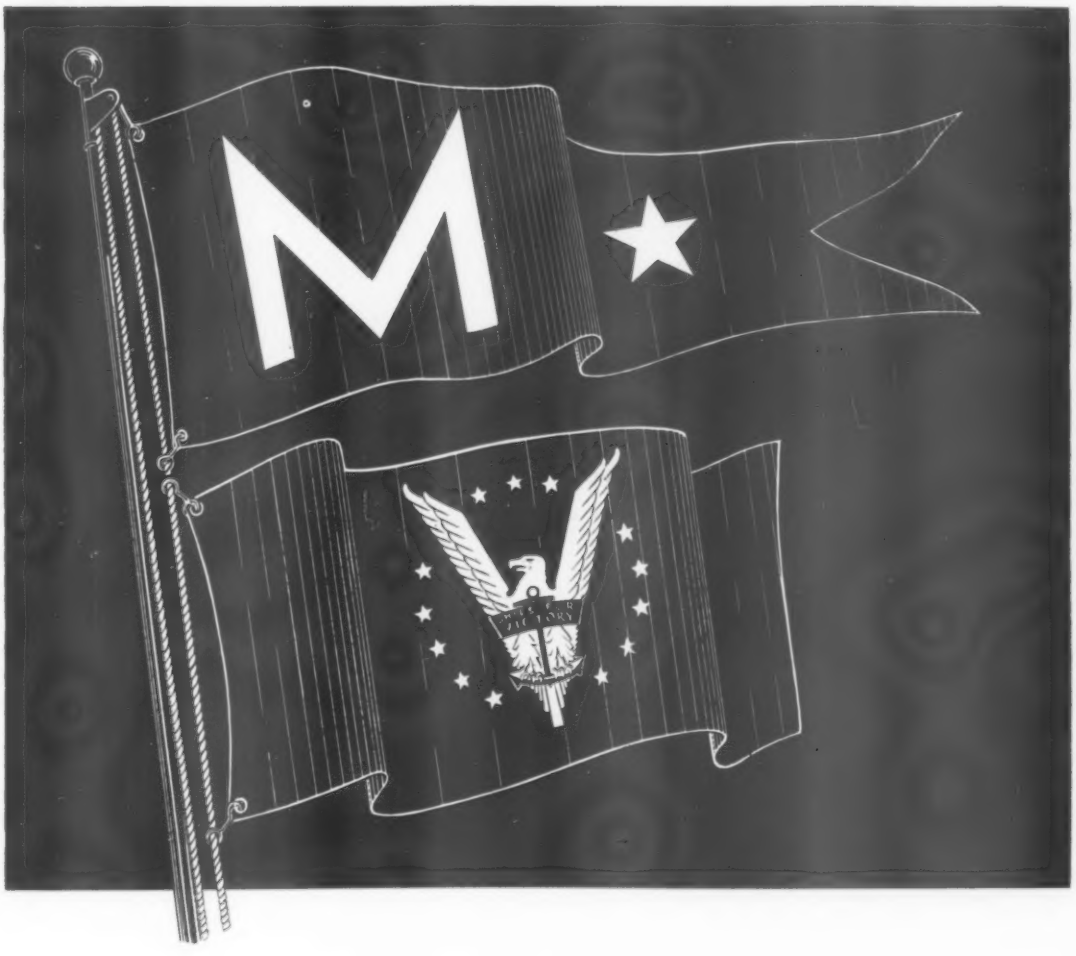
## Western New York

APRIL meeting of the Western New York Chapter of the A.F.A. held at Hotel Touraine, Buffalo, April 2, was opened by Chairman R. T. Rycroft, Jewell Alloy & Malleable Co., Buffalo, who stated that the meeting was to be devoted entirely to discussion of nonferrous practice. Chairman Rycroft introduced Duncan P. Forbes, national president of the American Foundrymen's Association, who spoke briefly of the 1943 convention and also described the new textbook on foundry practice which the association will publish soon.

First speaker of the technical session was Harold R. King, Metal & Alloy Specialties Co. whose topic was "Bronze Casting Alloys". Mr. King described the mixtures and alloys making up all the various kinds of bronze and brass castings, including tin bronze, red and yellow groups, bearing and packing metals and also alloyed groups including aluminum, silicon, monel, nickel bronzes and white metals. He described the purposes for which each group is used.

Next speaker was Milton H. Berns, Electro Refractories & Alloys Corp., who

(*Continued on page* 154)




# FORT PITT STEEL CASTING COMPANY

## *Awarded Maritime "M" Pennant*

### AND VICTORY FLEET FLAG

GOVERNMENT awards to war plants for meritorious achievement serve the purpose of removing the curtain of necessary secrecy to give the public a glimpse of what's going on behind the scenes.

Fort Pitt Steel Casting Co. received such an award yesterday, an "M" from the Maritime Commission. What this means is indicated by the fact that the local company is one of only seven so honored in the country at this time.

What has Fort Pitt done? The citation states it in generalities .The firm has been excellent in production. It has kept up or exceeded production schedules. It has been economical in the use of critical materials. It has lost no time through labor difficulties. It has achieved a high spirit of co-operation between management and workers. Its employes have demonstrated their concern for their country in various ways including large percentage purchases of war bonds.

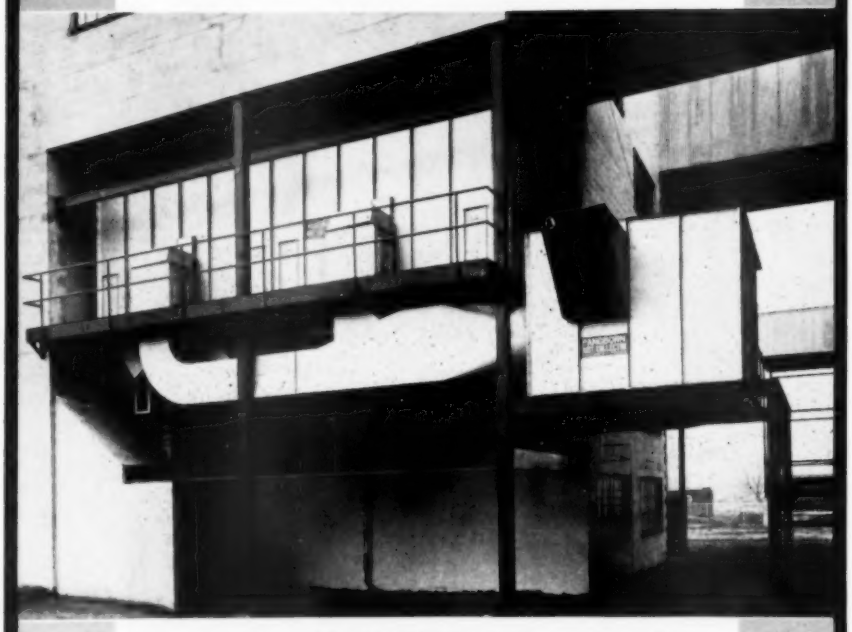
Altogether these accomplishments add up to sincere patriotism. McKeesport is proud of the company and its 1000 workers who, by achieving the "M", have brought a high industrial honor to the city.

*McKeesport Daily News*
*For Feb. 16, 1943*

**FORT PITT**
**STEEL CASTING COMPANY**
**McKeesport, Penna.**

*Pressure tested electric steel castings*

# DUST



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PANGBORN CORPORATION · HAGERSTOWN, MD.


(*Continued from page* 152)

discussed the use of crucibles and gave many pointers on their care in order to prolong their life. With the use of slides Mr. Berns also reviewed various types of crucible furnaces.

Crary Davis, American Magnesium Corp., followed with an interesting talk on "Magnesium Foundry Practice" which is comparatively new in the foundry industry. Mr. Davis described alloys used, discussing the purpose for which they are best suited, and gave the various characteristics of magnesium castings. He stated that the American Magnesium Corp. uses a highly permeable synthetic sand for both cores and molding and gives a great deal of attention to gating which is important in order to obtain sound and clean castings. Melting methods, pouring of the metal, heat treating and cleaning of the castings also were covered.

After each speaker an interesting discussion period followed. Through the courtesy of the Aluminum Co. of America, a movie entitled "Aluminum—Mine to Metal and Fabricating Processes" was shown. Ninety members and guests were present.

Next meeting of the chapter will be held May 7 at Hotel Touraine.—*J. R. Turner, acting secretary.*

## E. Canada - Newfoundland

INTEREST and enthusiasm in the Eastern Canada-Newfoundland "baby" chapter of the A.F.A. was well maintained at its sixth meeting held in Montreal on March 19. Further growth of the "baby" was registered at its having reached a total of 166 members with good prospects of reaching the goal set at 200 before the end of the first season.

The well attended meeting was addressed by Andrew Reyburn, a new chapter member although previously a member of the A.F.A. The speaker has established a reputation through papers presented before the A.F.A. Toronto convention in 1935, before the American Society for Metals and Canadian Railway Club. Taking as his subject "Co-operation between the Pattern Shop and the Foundry in the Production of Castings," the speaker stressed the importance of the engineer or customer contacting the foundry to discuss his particular problem even before the pattern shop and foundry get together. No less important is the absolute necessity of closest collaboration between pattern shop and foundry whether the pattern shop is an outside shop or under the same roof.

In conclusion Mr. Reyburn pointed out the ever increasing need for educating molders and more especially the apprentices in mechanical drawing and other phases of foundry practice not coming under their particular daily job, so that they may acquire a more general and useful knowledge of all that goes to make a first class casting. Only in that way can men be trained to fill the gaps of the older men as they drop out of the picture. Numerous questions were

handled ably by Mr. Reyburn at the conclusion of his paper.

Mr. Reyburn was connected with the Canadian National Railways for 24 years as pattern shop foreman and foundry superintendent, and is at present connected with the Wartime Merchant Shipping Board as supervisor of all casting orders and deliveries to meet wartime schedules of shipbuilding and allied industries.—*William J. Brown.*

## Birmingham

CHAIRMAN of the A.F.A. committee on co-operation with engineering schools, Frederick G. Sefing, International Nickel Co., New York, was the speaker at the March 19 meeting of the Birmingham District Chapter of the A.F.A. held at the Tutwiler Hotel. His subject was: "Where Can Education Be Used in the Foundry".

Mr. Sefing pointed out that men who understand the science involved in foundry problems as well as the foundry engineering viewpoint are required for intelligent application of science in foundry problems, upon which progress in the industry depends.

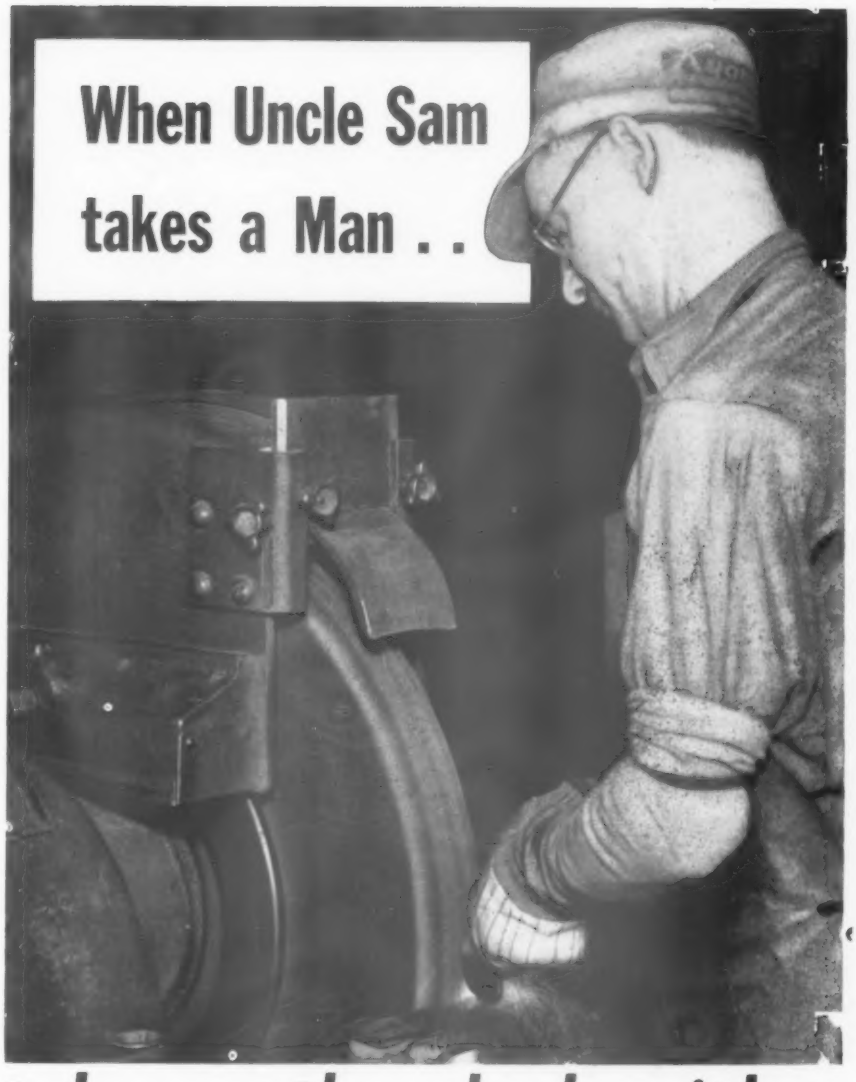
In view of the fact that the intelligent application of education generally betters that pursuit which demands improvement, Mr. Sefing said: "Foundries are ready for such improvement, and we can see best how education can help it in solving problems by reviewing what has been done, and see what is still to be done." He outlined in detail the science and engineering accepted in the foundry industry, the science now being applied, but still actively progressing, and future engineering development in the industry. —*H. B. McLaurine, reporter.*

## Ontario

CONTROL of nonferrous metals was discussed by A. C. Boak, chief, Substitutions and Specifications Section, Office of the Metal Controller, Department of Munitions and Supply, Ottawa, at the Feb. 26 meeting of the Ontario Chapter of the A.F.A. held at Toronto.

Prior to the talk, two excellent motion pictures were shown through the courtesy of the National Film Board, depicting many phases of the search for metals, their production and application in the Canadian war program.

Mr. Boak told something about the restrictions in supplies of materials which have made necessary control of nonferrous metals. Prior to the institution of control, certain plants tried to build up large inventories at the expense of others. Another important factor in the necessity for control was the loss of the world's main sources of tin to Japan early in 1942. After 3½ years of war, stocks of nonferrous metal have been depleted seriously, and the majority of today's production is for overseas shipment with little hope of any of it being returned in the form of scrap. Restrictions on pro-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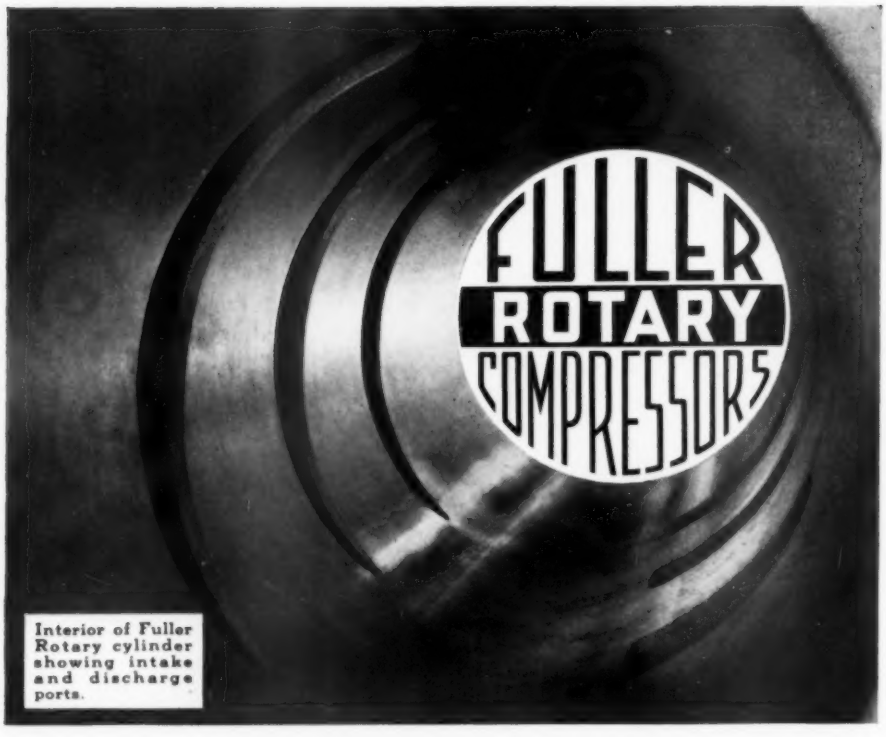

Interior of Fuller Rotary cylinder showing intake and discharge ports.

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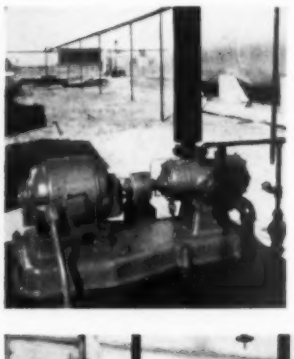

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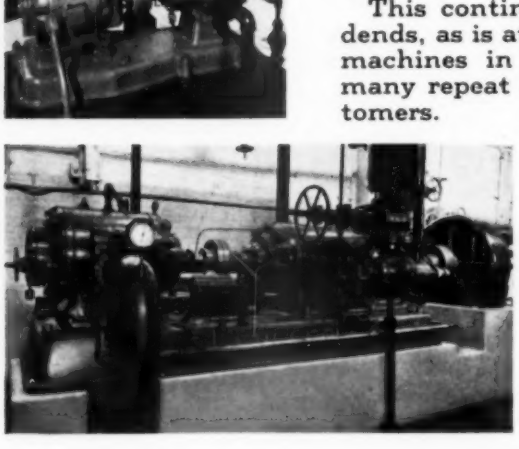

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duction of new civilian goods also tend to reduce the amount of scrap available, since articles now must last longer. Another important reason for control is the desire of the Metals Controller to simplify practice by the standardization of metal analyses for bronze castings in an endeavor to assist all foundries to meet the specifications to utilize silicon bronze, manganese bronze and lower tin bronzes wherever possible.

Other important orders of the Metals Controller with respect to tin were outlined. Those orders compel consumers of nonferrous products to segregate the resulting scrap according to the analysis of the original material. All tin bearing scrap is directed from foundries to ingot producers which, by means of laboratory control over the melts, are in the best position to utilize the tin content. This practically eliminates nonferrous foundries from use and uncertainties of scrap. The orders also eliminate many variations of tin bronze alloys and five tin bronzes now are specified which meet requirements.

Included in the discussion were the orders governing the use of copper, nickel, zinc, aluminum and lead in the foundry. The procedure which foundries should follow in obtaining release of the metal requirements was described and the personnel of the metals control outlined.

Mr. Boak gave a short supplementary paper dealing with test bars suitable for brass and bronze alloys. The importance of test bars has been increased by use of alternate materials and necessity for active determination of the physical properties. Four types of test bars were discussed briefly and the principal points to be observed in the production of satisfactory test bars outlined.—*George L. White, secretary-treasurer.*

## Quad-City

FORTY-SEVEN members and guests were present at the March 15 meeting of the Quad-City Chapter of the A.F.A. held at the Blackhawk Hotel, Davenport, Iowa. Chairman Alex Matheson, French & Hecht Inc., Davenport, Iowa, presided. He announced the following to be members of the 1943 nominating committee: Hyman Bornstein, Deere & Co., chairman; A. H. Putnam, A. H. Putnam Co., and John H. Ploehn, French & Hecht Inc. Nominations for next year's officials are to be announced at the April meeting.

"Cupola Operation" was the discussion topic for the evening. Fred J. Walls, International Nickel Co., Detroit, was introduced by Mr. Bornstein. Mr. Walls illustrated his talk with pictures covering various phases of cupola operation and control. After a brief review of the history of cupolas, he mentioned different ways of improving cupola practice and outlined methods of conserving critical raw materials.

"Pay attention to your cupola and you can perform miracles," Mr. Walls said, and, "consider the melting unit of your

foundry as a chemical laboratory and treat it accordingly." In a discussion of the construction of new shops, he pointed out that the cupola must be considered as the most important machine in the foundry and should be given plenty of room when building. Use of forehearths and insulated ladles also was discussed at some length.—*H. L. Creps, recording secretary.*

## Cincinnati

TWO films were featured at the April 12 meeting of the Cincinnati District Chapter of the A.F.A., held at the Cincinnati Club with 60 members and guests present. Frank E. Hutchinson, Reliance Foundry Co., Cincinnati, and chairman of the chapter presided.

P. E. Andersen, Harnischfeger Corp., Milwaukee, introduced the film "Cupola Charging". Program Chairman E. H. King, Hill & Griffith Co., Cincinnati, introduced the film, "Unfinished Rainbows" presented through the courtesy of the Aluminum Co. of America.

Chairman Hutchinson announced that the next regular chapter meeting will be on May 10, and that the annual stag outing and business meeting will be held June 16. The names of the nominating committee were presented, with William Ball Jr. as chairman. Nominations will be reported at the May 10 meeting.—*Henry M. Wood, secretary.*

## Detroit

PRODUCTION roundtable discussions on foundry practices have stimulated attendance at the meetings of the Detroit Chapter of the A.F.A. this year. Every meeting has attracted more than 100 members and guests. Ample facilities at the chapter's disposal at Rackham Educational Memorial have aided in the holding of separate group sessions.

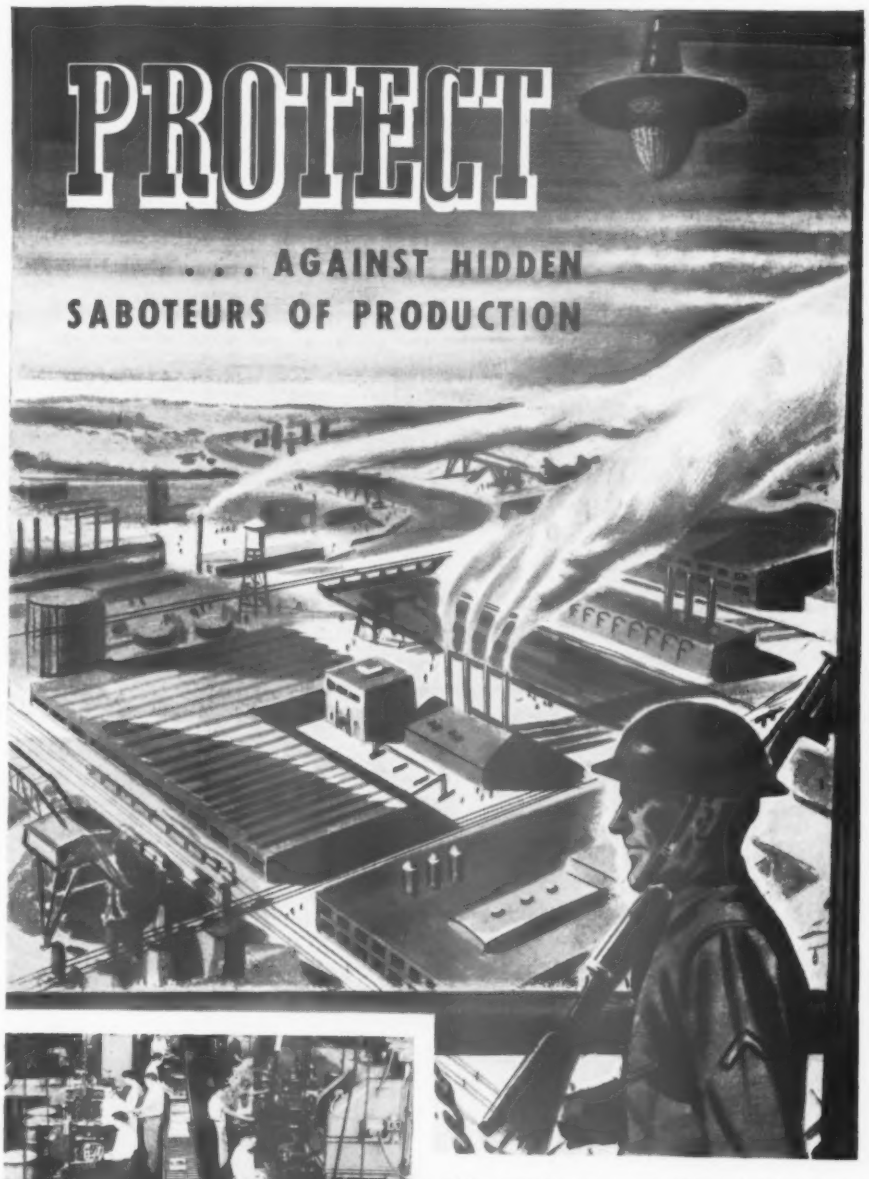
At the March meeting the discussion of cupola melting was directed by F. J. Walls, International Nickel Co.

Chapter chairman, F. A. Melmoth, Detroit Steel Casting Co., again led the discussion of steel foundry problems, concentrating on heading and gating.

As usual, the group meeting on one of the light metals, this time magnesium, outdrew all others. Almost half those in attendance gravitated to that session to hear M. E. Gantz, American Magnesium Corp., Cleveland, review some of the problems in sand and sand control for magnesium castings.

Discussion on molding and gating practice for brass castings was under the direction of J. P. Carritte Jr., True Alloys Inc., and he kept comment moving at a lively pace.

A pleasant surprise at the dinner preceding the roundtables was the appearance of two British foundrymen as guests of Mr. Melmoth. They were Walter W. West, general manager of foundries for the Leyland Motor Co. and his engineering associate, Stanley

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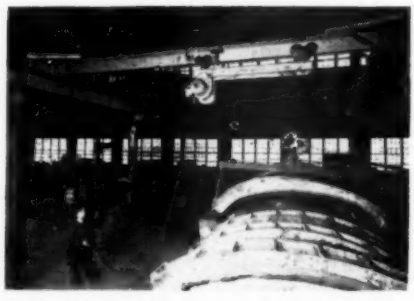

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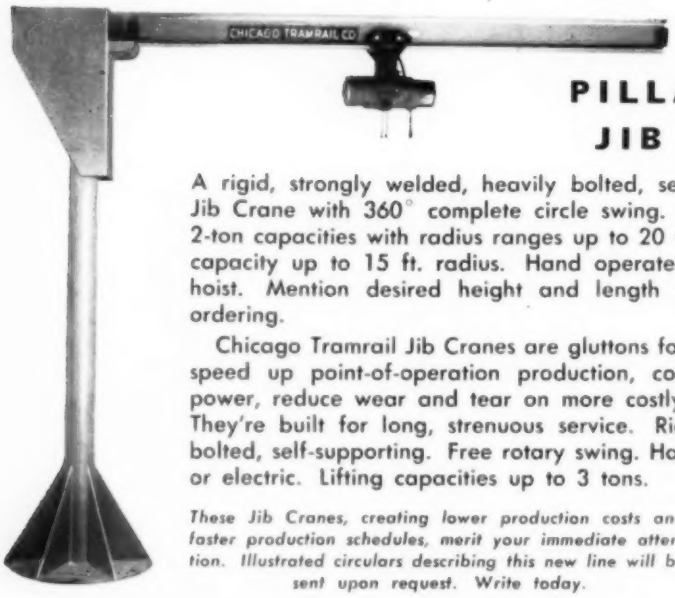


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Markland. Mr. West spoke entertainingly and was enthusiastically welcomed by the chapter. His picture of British foundries at war was most informative. —*A. H. Allen, secretary.*

## Northeastern Ohio

OVER 150 members and guests attended the regular meeting of the Northeastern Ohio Chapter, A.F.A., held on April 8 at the Cleveland Club. The meeting comprised a return engagement of the quiz type program.

Previous to the technical session President J. H. Tressler called on Frank Dost, chairman of the nominating committee, for a report of that committee. Mr. Dost announced that the following had been nominated as officers and directors for the next year, the election to be held at the May meeting: For president, J. G. Goldie, Cleveland Trade School; for vice president, R. F. Lincoln, Osborn Mfg. Co.; for treasurer, F. R. Fleig, Smith Facing & Supply Co., and for secretary, J. M. Lathrop, THE FOUNDRY. For directors for the 3-year term: J. B. Heisler, A. C. Williams Co., Ravenna, O.; H. C. Gollmar, Elyria Foundry Co., Elyria O.; Bruce Aiken, Crucible Steel Casting Co.; H. F. Roberts, Williams & Co.; H. J. Trenkamp Jr., Ohio Foundry Co. For director for the 1-year term: G. B. Carson, Case School of Applied Science. In accordance with the by-laws of the chapter J. H. Tressler, Hickman Williams & Co., retiring president, will serve on the board of directors for 1 year.

Through the courtesy of A. C. Denison, Fulton Foundry & Machine Co., the members saw several short news reels. Mr. Denison explained that similar films were being shown each Thursday to the men in his plant at noon and at night on company time since due to long work hours they did not have opportunity to attend motion picture theaters. He said he believed that such presentations were good spirit and morale builders.

For the quiz program a panel of nine experts was on the receiving end, and the questions covered a wide range of topics. The experts included Bruce Aiken, Crucible Steel Castings Co.; Frank Dost, Sterling Foundry Co.; R. Bryson, American Magnesium Corp.; Pat Dwyer, THE FOUNDRY; A. C. Denison, Fulton Foundry & Machine Co.; V. J. Sedlon, Master Patterns Co.; E. M. Gingerich, Aluminum Co. of America; Carl Beattie, Lake City Malleable Co., and E. F. Hess, Ohio Injector Co.

One question on patching procedure for the cupola elicited the response that it is essential to chip out all slag to insure a good foundation, and then patch with good quality materials to bring the lining to its original dimension. It was pointed out that the degree of burning out depended on melting temperature—the higher the temperature the greater the burnout; also if the cupola was being forced the burnout would increase.

An inquiry on a non-shrinking pat-

tern metal brought forth the reply that all suitable materials shrink, but that some white metal composition—too soft for production work— had a low shrinkage. Other problems discussed included the proper amount of core oil for heavy gray iron; the temperature at which magnesium alloys ignite; whether core washes and what kind should be used for malleable cast iron; air pressure for blowing cores; advantages and disadvantages of aluminum-copper and aluminum-silicon alloys; why there are such wide variations in gating and risering similar steel castings; skin drying molds; fluxes for melting scrap aluminum, etc.

Next meeting of the chapter will be held on May 13, and will constitute the annual "Old Timers, New Timers and Some Timers" night. Due to numerous difficulties resulting from war time conditions the annual June outing will not be held this year.—*Edwin Bremer, chairman of publicity.*

## Western Michigan

SIXTY-SIX members and guests enjoyed a fine turkey dinner at the Ferry Hotel, Grand Haven, Mich., where the Western Michigan Chapter of the A.F.A. held its March 8 meeting. Thomas E. Barlow, Vanadium Corp. of America, Detroit, gave a lecture on the interesting subject, "Inoculation."

Photomicrographs were shown and Mr. Barlow pointed out the fact that so-called modified iron is improved with inoculation. The speaker emphasized the necessity of having sufficient inoculant to do the required job under varying conditions. While on some days a lesser amount might satisfactorily have the desired effect, on other days conditions might change and it would not have the proper effect. Therefore, the maximum amount needed should always be used. A general discussion followed the talk.

Added entertainment of the evening was the performance of a local magician, O. T. Gylleck.—*K. C. McCready, secretary.*

## Chicago

HIGHEST attendance of the year was achieved by the Chicago Chapter, of the A.F.A. at its April 5 meeting at the Museum of Science and Industry. Tours through specially-selected exhibits and the annual Executives' Night program combined to net a turnout of close to 425 members and guests.

Following a turkey dinner in the museum's dining room, the audience listened to brief remarks by Duncan P. Forbes, president, Gunite Foundries Corp., Rockford, Ill., and national president, American Foundrymen's Association; C. E. Westover, executive vice president of the association, Chicago; and Maj. Lenox R. Lohr, president, Museum of Science and Industry.

President Forbes predicted a highly competitive postwar position for the foundry industry. To anticipate and pre-

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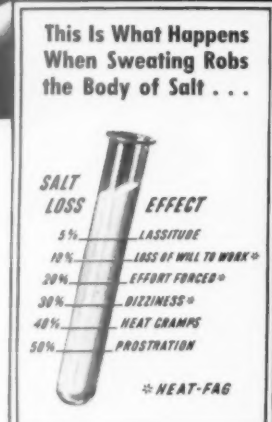


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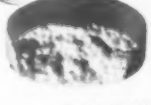

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pare for that time, he urged proper consideration be given to development of better molding and casting procedure, improvement of metals, and reduction in manufacturing costs. Only by accomplishing these ends can foundrymen guarantee a position in the sun as favorable as the one they have enjoyed in the past, was Mr. Forbes' opinion.

Tracing the origin and history of the operating foundry unit in the museum was the assignment of Mr. Westover. At the request of the museum, the American Foundrymen's Association agreed in 1936 to sponsor an exhibit, and immediately appointed a committee to plan it. After three years' effort, during which time the project was turned over to the Chicago Chapter, the unit was installed and opened to the public in 1939. Upon this occasion, the chapter held a dedication meeting at the museum.

Equipment and supplies used in the exhibit were made available by a large number of companies, which have maintained their interest in the project. During the past year, the Chicago Chapter raised additional funds to install a public address system and better accommodations for spectators so that the demonstration now is about as effective as it can be made.

Major Lohr in his comments thanked the association for having made the unit possible and for continuing interest in keeping it operating. Because it is in daily operation, actually melting and producing castings, he regards it as one of the museum's outstanding features.

Chapter chairman A. G. Gierach, works manager, American Manganese Steel Division, American Brake Shoe & Foundry Co., Chicago Heights, Ill., announced that no mail additions to nominations for chapter officers reported at the preceding meeting, (THE FOUNDRY, April, 1943, p. 190), consequently proceeded to election of those nominees. Installation will take place at the May 3 meeting.

Roundtable discussions will constitute the program for that meeting. Topics for the various groups are as follows: Steel—"Gating and Risering"; Gray Iron—"Changes in Gray Iron Brought About by the War and Lasting Effects Upon the Industry"; Malleable Iron—"Metallurgy of Malleable Iron"; Nonferrous—"Aluminum and Magnesium"; and Pattern—"Co-operation of Pattern Shops, Foundries and Trade Schools." — *Erle F. Ross.*


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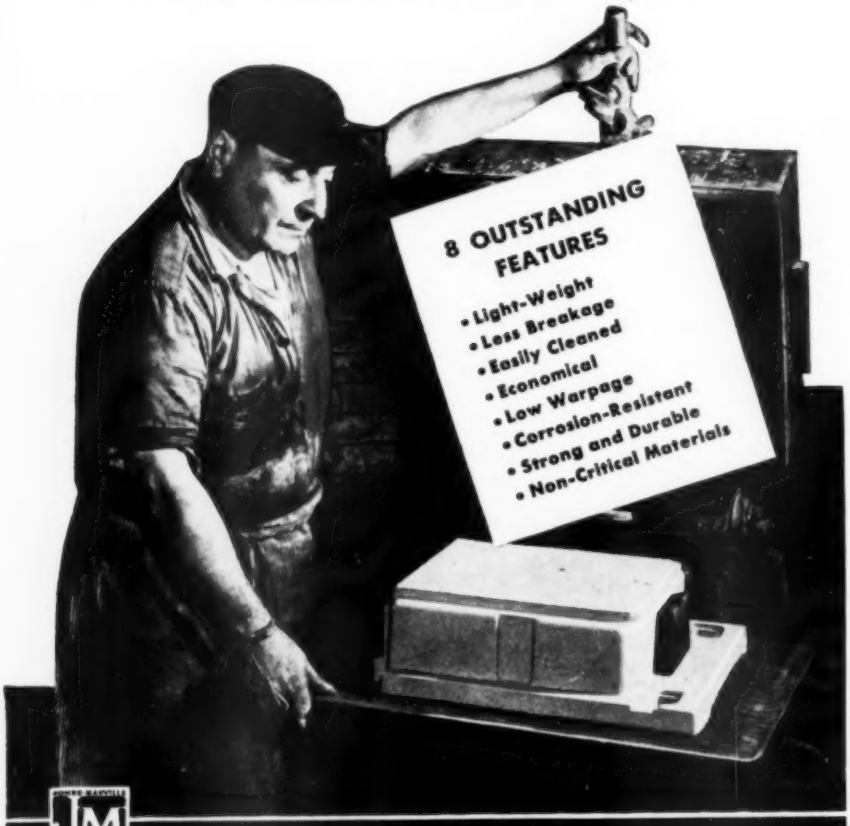


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## New Jersey

LABOR costs was the topic of discussion at the regular monthly meeting of the New Jersey Foundrymen's Association held March 22, Downtown Club, Newark, N. J. The speaker was Henry Sokolsky, manager, planning and production departments, B. F. Sturtevant Co., Boston, who stated that many foundries are overlooking a substantial saving in costs by not employing a carefully conceived wage incentive plan. He pointed to savings in labor costs under such a plan and said that they should prove particularly impressive in the case of foundries where labor is such an important cost factor. Possibly 40 to 50 per cent of the cost of a casting could be charged to direct labor, he estimated.

Foundries have been far behind many other branches of industry in the application of wage incentives, Mr. Sokolsky indicated. He cited one eastern district in which 54 per cent of all manufacturing industries were employing incentive systems and in which only 34 per cent of the foundries were doing so. He had reason to believe that the percentage of foundries in certain other districts ran even less. Mr. Sokolsky pointed out that government was controlling basic wage rates in an effort to stabilize them and thus combat inflation, but that it did not regard as inflationary increases in pay which were proportionate to increases in production, such as may be achieved under a sound incentive system.

He described briefly various leading incentive plans, referring to the straight piece work system as the one most commonly used. He regarded that system as outstanding, adding that it is easy for the employer to administer and that it gives him a good line on costs. Also, it eliminated many problems of discipline and provides a reduction in fixed overhead.

However, the speaker said it is im-

portant, as in all special incentive programs, to make sure that it is set up on accurate time studies. Complications often arise where piece rates are set unduly high, and have to be revised later, generally to the profound dissatisfaction of the workers.

He mentioned the group incentive plan as having a number of advantages and as probably gaining more rapidly in application than any other type. It makes for greater co-operative effort, gives a man a steadier wage at the end of the week, eliminates favoritism and helps considerably in breaking in new operators. The system also simplifies accounting and clerical effort.

Question was raised as to how an incentive system can be applied to a jobbing foundry. Mr. Sokolsky admitted it may take a little longer to install than in a straight production shop, but that it can be done. Questioned about indirect labor such as crane operators and others, he replied that such labor could be covered easily in the group incentive plan.

Sometimes it is difficult to appreciate that higher wages and lower labor costs can go hand in hand, but this has been demonstrated repeatedly where an effective incentive plan is used. Most agree that there are at least ten factors to consider in setting up an incentive system: Supervision required; judgment required, responsibility as to material; responsibility as to equipment; manual dexterity; working conditions; hazards of job; physical requirements; education requirements; and learning period required. The value of each factor will vary in different plants.—*B. K. Price.*

## Chesapeake

REGULAR meeting of the Chesapeake Chapter of the A.F.A. was held Feb. 23 at the Engineers Club, Baltimore. J. E. Crown, U. S. Naval Gun Factory, Washington, and chapter chairman, presided. C. E. Westover, executive vice president of the A.F.A., was the guest speaker.

Mr. Westover described the A.F.A. as a means of bringing local foundrymen together to discuss their problems and to help each other improve conditions in their foundries, ultimately improving the products which they make. He pointed out that the association as a whole has achieved great success nationally along those lines and as a result many ideas and processes in the foundry industry have been developed.

Following Mr. Westover's talk, the roundtable discussion sessions began. E. C. Troy, metallurgist, Dodge Steel Co., Tacony, Philadelphia, presided over the steel discussion. Walter Levi, metallurgist, Lynchburg Foundry Co., Lynchburg, Va., presided over the gray iron table and John Cochrane, Cochrane Brass Foundry, York, Pa., headed the group on nonferrous castings. Such discussions have proved interesting to the members of the chapter and are well attended.—*Frederick Bruggman.*

## Central Indiana

ONE hundred members and guests were present at the April 5 meeting of the Central Indiana Chapter of the A.F.A. held at Washington Hotel, Indianapolis. Max Kuniansky, general manager, Lynchburg Foundry Co., Lynchburg, Va., was the principal speaker and his topic was, "Today's Cupola Operation and Scrap". Chapter chairman, B. P. Mulcahy, Citizens Gas & Coke Utility, Indianapolis, presided, and J. P. Lentz, foundry metallurgist, International Harvester Co., Indianapolis, served as technical chairman.

Mr. Kuniansky discussed briefly the manner in which the Lynchburg Foundry Co. melts metal and its procedure. This was followed by a long and lively question and answer period.

"Alloys in Cast Irons and Steels" will be the topic of a discussion by V. A. Crosby, Climax Molybdenum Co., Detroit, at the chapter's May 3 meeting to be held at Washington Hotel.—*Ralph A. Thompson, secretary.*

## Metropolitan

MEMBERS and guests of the Metropolitan Chapter of the A.F.A. at its meeting held April 5 at the Essex House, Newark, N. J., heard an exper-


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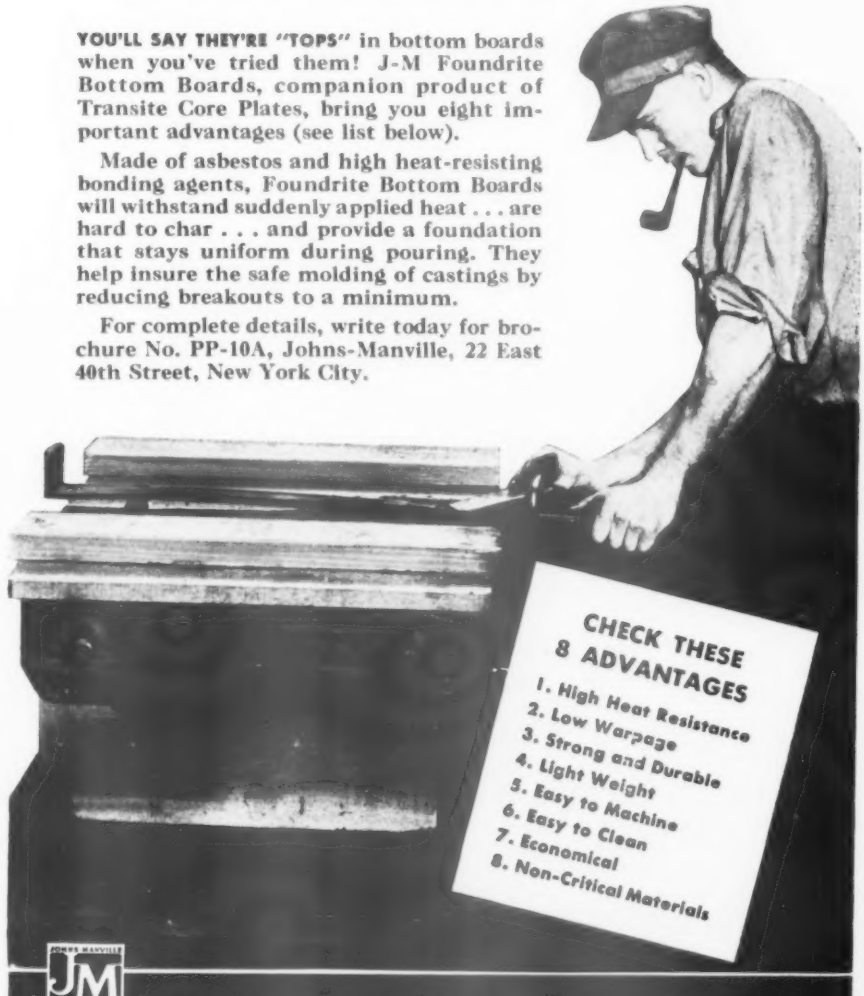


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ienced man emphasize the necessity for good control in producing quality castings. William G. Reichert, W. G. Reichert Engineering Co., Newark, was the speaker and W. E. Martin, Sperry Gyroscope Co., functioned as the technical chairman.

Mr. Reichert pointed out that castings should be designed properly before being submitted to the foundry, and since a casting is no better than the pattern from which it is made, special attention should be given to pattern design and pattern equipment. Sand control, metal control and scientific approach to all phases of foundry operations are requirements that must be recognized if the final product is to be of the best quality and meet requirements.

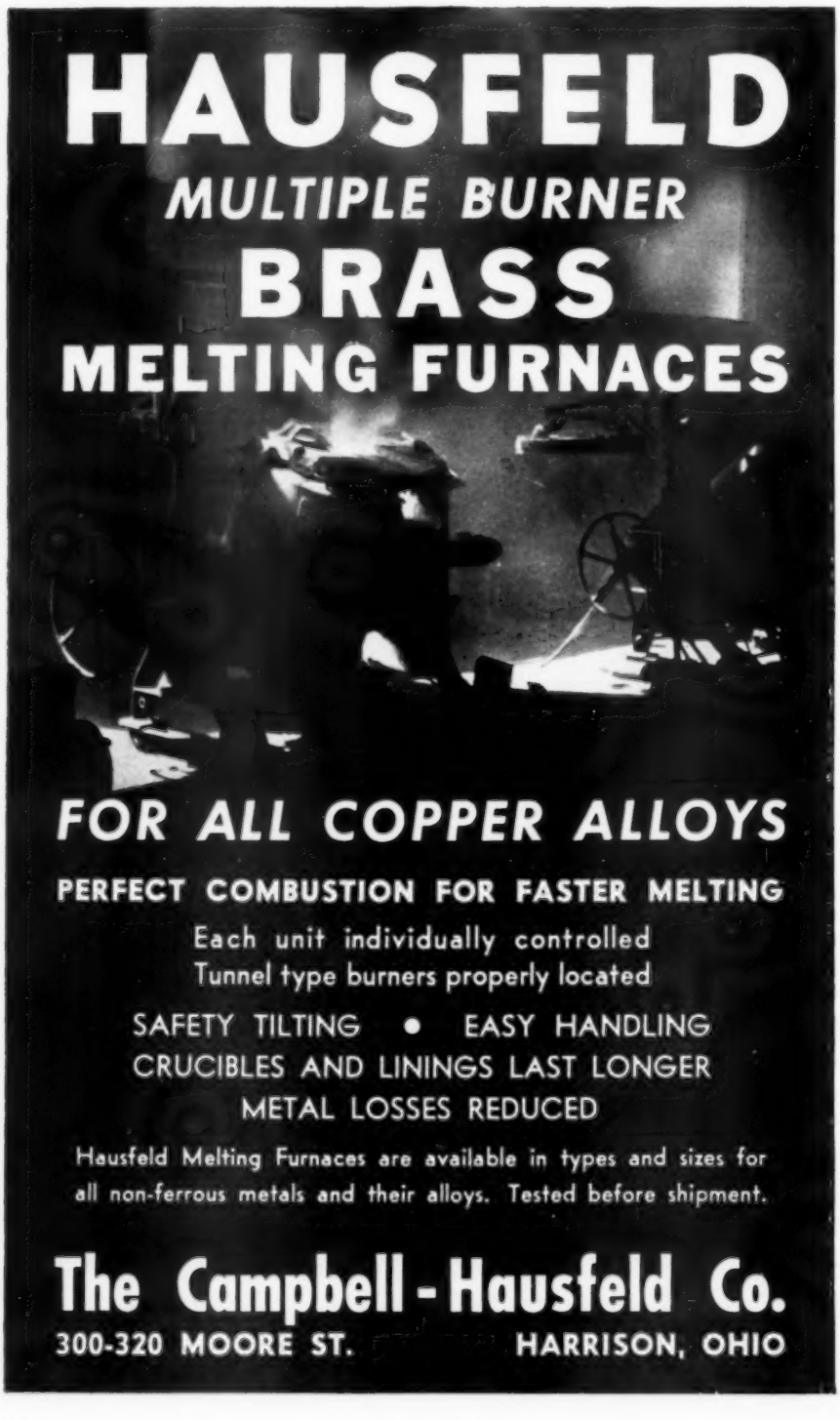
Next meeting of the chapter will be held at the Essex House, Newark, on May 3.—*R. E. Ward, chairman, publicity committee.*

## Toledo

APRIL meeting of the Toledo Chapter of the A.F.A. was held at the Hillcrest Hotel, April 9, with an attendance of 36. Meeting was arranged by members of the malleable iron group, chairman of which is N. Mahoney, Maumee Malleable Castings Co., Toledo. Speaker of the evening was James Lansing, shop practice and research engineer, Malleable Founders Society, Cleveland, whose subject was "Cast Malleable Iron Practice".

Mr. Lansing's talk covered various steps performed in producing cast malleable iron and the uses of the finished product. The talk was supplemented by some interesting slides. Following his presentation, the group discussed thoroughly with Mr. Lansing the properties and heat treatments of malleable cast iron.

Chairman C. F. Carson National Supply Co., Toledo, announced that the board of directors was planning an outing to be held as soon as the weather permitted. —*G. W. Buchanan, reporter.*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## Apprentice Contest Winners Named

Winners of the Wisconsin Chapter of the A.F.A. apprentice contest sponsored with the co-operation of the Milwaukee Vocational School, were selected recently in the gray iron, steel, nonferrous and patternmaking groups. Castings and patterns made by those ranking highest in each group were displayed and entered in the national apprenticeship contest at the national convention of the American Foundrymen's Association held in April in St. Louis.

Winners of the contest were selected by a committee of foundrymen including C. W. Morisette, chairman; J. Van Kooy, G. A. Zabel, J. McGill, T. E. Ward, E. P. Meyers, L. Bartell, A. H. Schott, R. Riedel, H. W. Warner, Oscar Woehlke and O. T. Nelson.

Patterns were made as a part of the contest at the Milwaukee Vocational School under the supervision of J. Van Kooy, the school's patternmaker instructor. They were then taken to those foundries which had apprentices enrolled in the contest and the youngsters were required to make castings from them. The committee selected the winners in each group after carefully inspecting the castings each apprentice had made from the patterns.

Fred Bartel, Allis-Chalmers Mfg. Co., won first place in the gray iron group, while Alphonse Terek and Jerome Lanman of the same company won second and third places respectively. In the steel group John Nowak and Arthur Tazalla, Maynard Electric Steel Casting Co. won first and third places respectively, with Frank Chevonec of Falk Corp. in second place. Ferdinand Sevenz of Ampco Metal Inc. won first place in the nonferrous group with Tony Ivanotich, Standard Brass Works, second and Otis Wilson, Nordberg Mfg. Co., third. In the patternmaking section of the contest R. Satorius, Falk Corp. won first place, P. Huschbroeck, and R. Symonia, Allis-Chalmers Mfg. Co. won second and third places.

## Foundry Lectures Well Attended

Ninety men and boys, ranging in age from 16 to 65, participated in a recent series of free lectures offered by the War Industries Training School of Stevens Institute of Technology, Hoboken, N. J., on "The Fundamentals of Foundry Engineering". The course consisted of 24 lectures dealing with ten major subjects on foundry work.

Committee of members of the Metropolitan Chapter of the A.F.A. which assisted Dr. Alfred Bornemann, associate professor of Stevens, in planning the course, included: F. G. Sefing, International Nickel Co.; T. D. Parker, Climax Molybdenum Co.; W. C. Schulte, Curtiss-Wright Corp., and R. E. Ward, Eclipse Aviation Division, Bendix Corp.

## Presents Award to Veteran Molder

A. W. Robertson, chairman of the board, Westinghouse Electric & Mfg. Co., recently conferred the Order of Merit on Edward C. Himmler who makes and sets large molds at the company's Trafford, Pa., foundry. The citation listed his achievements, particularly for teaching

younger men the tricks of the trade. The accompanying bronze medal carried a silver "W" and an inscription "Whom his fellow men delight to honor."

He was elected a member of the Order "for his ingenuity in the molding of large intricate castings; for his ability to visualize the final product of the foundry and to determine the logical steps to the desired results; and for his unselfish attitude in imparting to his fellow craftsmen the sound principles of good workmanship that have guided him through his years of association with Westinghouse foundry activities."

Mr. Himmler joined Westinghouse in 1903 at East Pittsburgh and that year made molds for the original foundry equipment at Trafford, some of which still is in use. Three years later he became foreman, then became general foreman and for a time served as foundry superintendent. His first "Big Job" was in 1908 when he molded the turbine casings for the battleship ARKANSAS.

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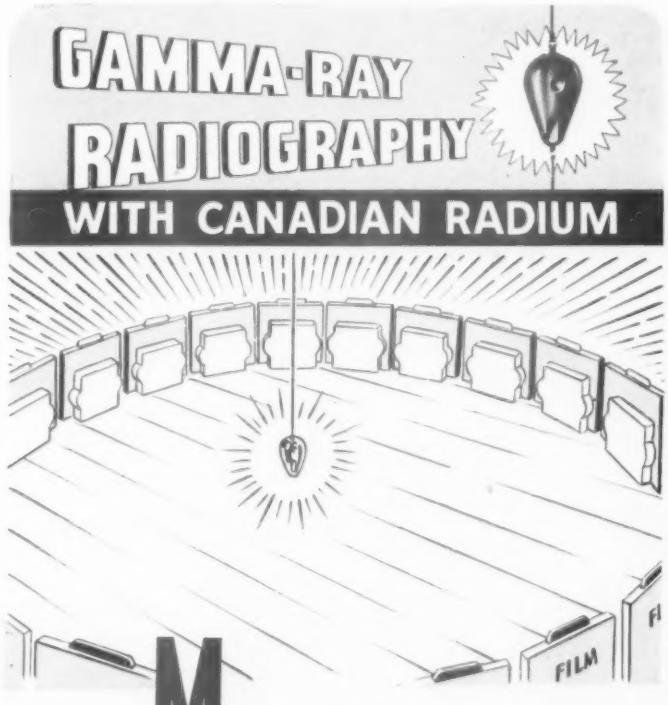
Manning, Maxwell & Moore Inc., with plants at Bridgeport, Conn., Boston, and Muskegon, Mich., has opened a new plant in Tulsa, Okla. to manufacture oil relief valves. G. P. Kirchhofer is plant manager; John Scott, superintendent; James W. Schwarberg Jr., office manager and purchasing agent.

## Issues Bearing Book

Federal-Mogul Corp., Detroit, has published a 248-page book entitled "Handbook of Sleeve Bearings," by Albert P. Willi, its chief engineer, which is designed to be a practical guide for the engineer, designer and draftsman in the selection, design and application of sleeve bearings. It is divided into 11 sections relating to such phases as materials of bearing construction, precision insert split bearing, oil grooving, special types of split bearings, shims, appendix, and dimension sheets for various types of split and full-round bearings for all industrial applications.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# Melt Aluminum Alloys in LOW-FREQUENCY FURNACE

By HOWARD LINN EDSALL
Ajax Metal Co.
Philadelphia

GAS absorption during melting of aluminum alloys is a problem which has engaged the attention of foundry chemists and physicists over a long period. It is well known that harmful gases contained in the combustion byproducts of the melting furnaces are transferred to the melt through crucible walls, or absorbed by exposed surface areas of the molten charge. The combustion gases contain hydrogen and hydrocarbons, and moisture which is brought in with the combustion air. It often has been observed that gas absorption is increased at certain times when the moisture content of the atmosphere is higher, and this only can be explained by the dissociation of water vapor injected into the burners with the air of combustion.

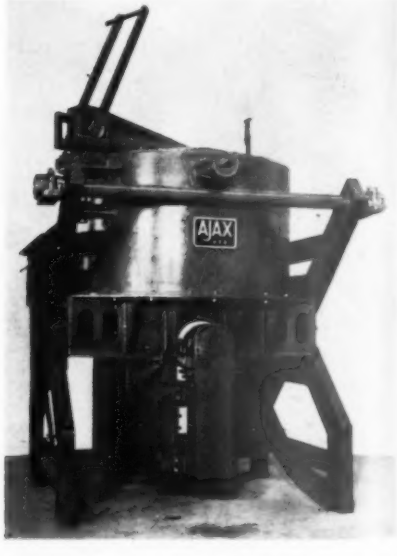
Many solutions to the problem of gas absorption by aluminum alloys have been suggested, all of them complex, most of them requiring much manipulation of the melt. However, one practical solution appears to be the development of a special low-frequency induction melting furnace for aluminum and its alloys. The furnace, known as the Ajax-Tama-Wyatt, discloses efficiencies of between 70 and 75 per cent, melting 5 pounds per kilowatt-hour, including slight superheats as necessary.

In this type of furnace the heat is generated in a "loop" channel surrounding the primary winding of what is in reality a low-frequency transformer—of which the molten charge is the secondary. Consequently, heat is generated directly in the metal at the bottom of the charge, and the surface is not the hottest zone. Absence of surface overheating is of especial importance in handling aluminum alloys, for they tend to absorb gases from the atmosphere at high temperatures. Electrical stirring action of induction furnaces permits addition of alloying agents to aluminum directly, without the necessity of intermediate "mother alloys" or hardeners.

Average metal losses are low. For miscellaneous aluminum alloys, losses in the new furnace are as follows: Foundry ingots (pigs) 0.6-0.8 per cent; large scrap 1.0 per cent; sheet scrap, baled 1.5 per cent, and foil scrap, baled 2.0 per cent.

Since aluminum demand requires furnaces of large capacity, they are designed in sizes up to 500 kilowatts, with a production of 2200 pounds per hour. They are made generally along the established lines of the Ajax-Wyatt brass melting furnaces, with pouring spouts, and with mechanical or hydraulic tilting equipment, both nose-tilting and center-tilting types.

Development work was carried out simultaneously in the Ajax Metal Co.




*Front view of a typical 250-kilowatt induction furnace for melting aluminum alloys. Melting rate is approximately 1250 pounds per hour, capacity 1 ton*

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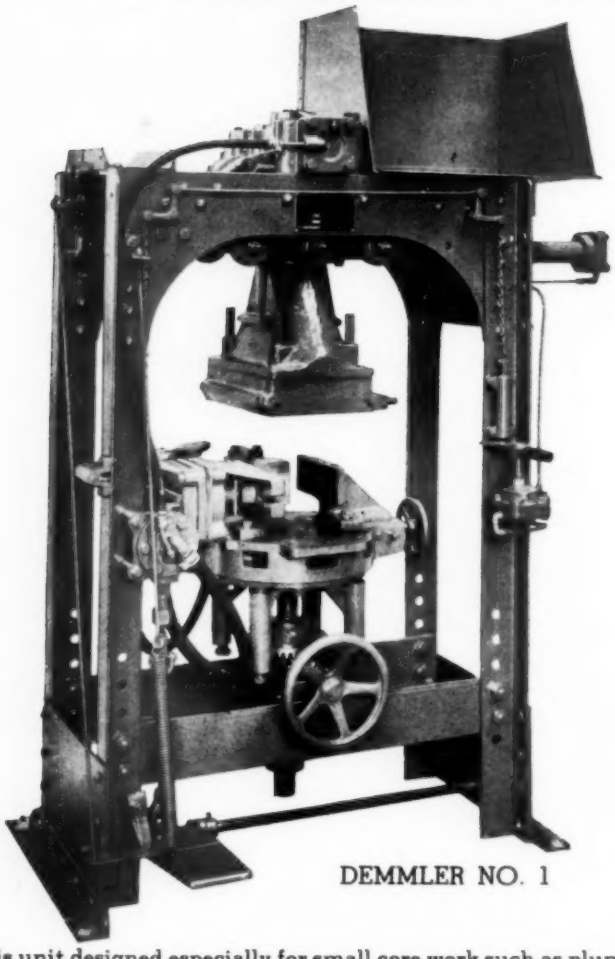

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plant in Philadelphia by J. R. Wyatt, and in Neuhausen, Switzerland, by Manuel Tama, Ajax European engineering division. Both pilot and full-scale operations were set up in foundries of the Aluminum Industrie, Neuhausen, under the direction of Dr. A. von Zeerleder, international aluminum technologist. Important installations in the British Isles and on the Continent followed quickly, with increasingly large furnace batteries and sizes.

Observations generally checked as fundamental to the art were in accord everywhere on the following points: 1. Pinholes, speckled metal, blisters, blowholes, and similar cavities found in aluminum alloy castings are due chiefly to gas absorption during melting. 2. Hydrogen and water vapor are the omnipresent sources of prevailing difficulties. 3. Pure aluminum always absorbs less gas than aluminum alloys under identical conditions.

### Stirring Aids Production

Those facts, together with the low specific gravity of aluminum alloys (2.46 for pure aluminum at the melting point) have important bearing on induction melting practice as observed. The stirring movement, which aids in producing an extremely homogeneous mixture, has a helpful effect unless it is found to occur at the bath surface, or where molten metal is exposed to air.

Stirring is more apparent in induction furnaces when melting light metals. However, with a light metal such as aluminum, a flexible skin of aluminum oxide forms at the surface which is not damaged easily by the stirring action. In fact, it protects the surface and prevents further oxidation, and to this is attributed the low melting losses of the induction furnace. This follows partly from the fact that the temperature at the surface of the bath is lower than that prevailing at the bottom of the furnace in that portion of the metal charge in which the heat is generated.

With the induction principle it is easy to attain and hold a desired temperature for any type of aluminum alloy. The heat is induced within the charge at a rapid rate, and the operator checks the rise continuously, dropping the power input as soon as correct temperatures are reached. The automatic stirring distributes heat uniformly throughout the entire molten charge, and recording pyrometers and automatic temperature controls are used with complete success in maintaining desired temperatures automatically. Hence, it is not difficult to maintain the temperature at the desired point.

The large furnaces are adapted for direct connection to any 3-phase power supply through the medium of Scott-connected transformers, and when so connected the load distribution is uniform over the three phases. The smaller units are single-phase type, supplied with a battery of capacitors. The power factor of the supply line is corrected to 80 per cent. Such furnaces, working continuously day and night, form an ideal load, and their use tends to decrease current unit cost in plants where they are operated.

The illustration shows a 250 kilowatt induction furnace with a melting rate of 1250 pounds per hour, capacity 1 ton. The largest units measure 10 feet from lip of spout to rear of tilting mechanism, with a weight of 30,000 pounds. Smaller units, for laboratory and experimental work, will melt 60 to 100-150 pounds per heat.

---

Glyco Products Co. Inc., has moved its administrative offices to larger quarters. Offices now are located at 26 Court Street, Brooklyn, N. Y.

## Opens Boston Office

Hercules Powder Co., Wilmington, Del., has opened sales offices in the Statler Office Building, Boston. Homer C. Simmons, New England manager of sales, cellulose products department, will head that departmental unit in the new offices; Howard C. Bates, in charge of synthetics department sales for that territory, will make his headquarters there; and G. J. Rising, former resident manager at Stoneham, Mass., has been transferred to the company's office in Pittsburgh where he will represent the industrial chemical division.

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## Revises Method of Obtaining

# ALUMINUM PATTERNS

EFFECTIVE May 1, foundries are required to follow a new procedure in obtaining aluminum pattern castings

A letter issued by the Aluminum and Magnesium Division, WPB, points out that finished patterns are classed as operating supplies and are obtainable under CMP Regulation No. 5 (MRO). However, there is an important distinction when aluminum castings for patterns, rather than the finished patterns, are purchased. In this case the pattern castings are obtained pursuant to CMP Regulation No. 1—unless they are made from old pattern equipment furnished by the prospective user of the new patterns. When the buyer supplies an amount of scrap or obsolete aluminum pattern equipment equal to the weight of the new pattern castings, no CMP authority or priority is necessary to accept delivery.

In buying finished patterns, the foundry is required to furnish only the certification and preference rating prescribed by Regulation No. 5. This rating will be AA-1 or AA-2X, depending upon the classification, specified under the regulation, into which the foundry falls.

Since relatively few foundries have been exchanging scrap or obsolete aluminum patterns for new equipment, the large majority of those purchasing aluminum castings for patterns will be required, under the new setup, to secure an allotment number from WPB by filing Form CMP-4B with the Tools Division at Washington. This allotment then is served on the supplying foundry. It should be remembered that this allotment number is separate and distinct from the allotment number under which production castings will be made.

WPB also has made it clear that the procedure for obtaining aluminum patterns will apply whether or not the foundry making the pattern castings is a "captive" foundry or the pattern shop is part of the foundry. In addition, there are certain limitations on the use of aluminum patterns in the foundry. Unless the use of such patterns is essential to filling quantity production of authorized controlled material orders or of other quantity production orders bearing priority rating AA-2X or higher, aluminum may not be used without specific authorization pursuant to paragraph (d) of the aluminum allocation order—M-1-i.

### Issues Specific Instructions

A concise summary of the new requirement on this subject, together with specific instructions for obtaining an allotment number, are contained in a letter prepared by M. E. Kohler of Scientific Cast Products Corp., Cleveland, and sent to purchasers of aluminum pattern castings. This letter, in part, follows:

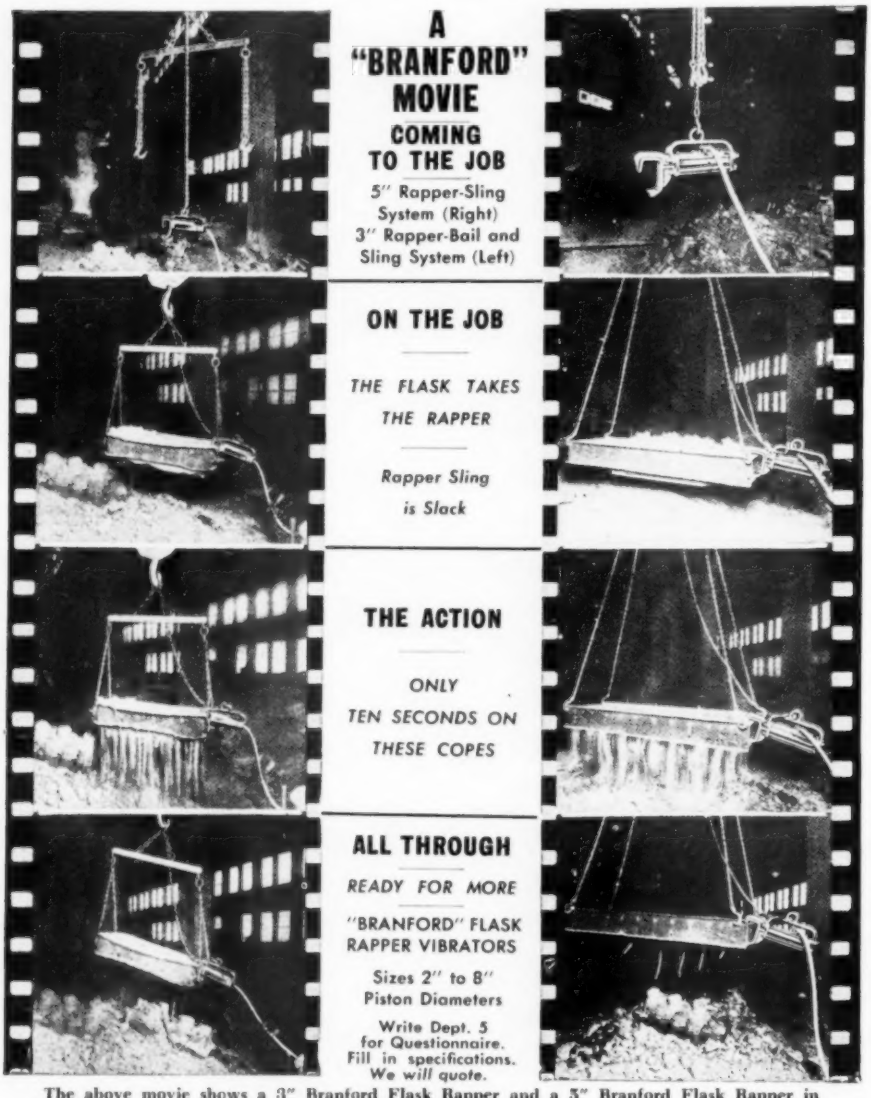
"Beginning May 1, we or any other foundry cannot accept orders for aluminum matchplates or pattern castings, except by one of the following methods:

"I. You supply an amount of scrap or obsolete aluminum pattern equipment equal to the weight of new pattern castings. CMP authority or priority is not necessary when scrap or obsolete aluminum patterns are furnished.

"II. Your order is certified to by the required certification, bears a rating of AA-2X or higher and also shows your allotment number. This is not the allotment number under which production castings will be made.

"Starting May 1, 1943, under Controlled Materials Plan, it will be necessary by everyone buying, or obtaining from their own foundry, aluminum pattern castings to secure an allotment number for aluminum pattern castings by completing CMP-4B. This includes pattern jobbers, foundries and manufacturers, even though they have their own pattern shops and/or aluminum foundries.

"To obtain your allotment number you should file immediately 3 copies of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Form CMP-4B. These, together with instructions, are obtainable from your local WPB office. However, we offer the following suggestions:

"In space headed—Product to be Made by Applicant as Limited in CMP Class B Product List—insert 'Foundry Machinery, Equipment & Supplies.'

"In space headed—Applicant's Own Description of Product to be Made—insert 'Patterns.'

"Section A must be filled out for 12 months starting with April, 1943 and including March, 1944. This is an estimate of the number of jobs you will make and the dollar value of them.

"In Section C, part 6, under Aluminum Castings, estimate the pounds of aluminum castings you will need.

"In Sections D and E: Columns 2 and 3 of both these sections will be identical, and the division in Section D should be according to your records. However, in Section E the dollar value will be carried in Column 10 only because patterns are used entirely in foundries and are considered as civilian supplies."

## Combines Shield and Air Filter

A special dust collecting apparatus, consisting of a combination glass shield and air filter, has been installed by Cleveland Graphite Bronze Co., Cleveland, to protect women operators of buffing wheels and rotary wire brushes in polishing and removing burrs from machine parts.

The shield, made of shatter-proof glass, is fastened at an angle to the top of the bench, so that it stands between the worker's hands and her face. An air duct at the bottom of the shield extends down through the work table and connects with an air filter placed under each bench. Operated by ½ to ¾-horsepower motors, each filter serves as both an exhauster and dust collector in a single compact unit. Since the shield is narrow, the operator has room for sufficient freedom of motion for her hands and arms in the buffing and polishing operations.

Other problems of air purification have been met in this plant, which is the windowless type. The air circulating system, used for both heating and cooling, has a capacity of 1,000,000 cubic feet a minute and holds the temperature at 70 degrees and relative humidity at slightly less than 50. Air purifiers are installed on metal-plating apparatus, and in the room where bearing castings are poured, each of the furnaces is provided with a filter that reduces dust and smoke to a minimum.

A new booklet explaining the use and care of fire extinguishers has been compiled by American-LaFrance-Foamite Corp., Elmira, N. Y. Various types of extinguishers, their maintenance, and use in fighting various classes of fires are discussed. The booklet is free upon request.

## Pangborn Awarded Army-Navy "E"

Pangborn Corp., Hagerstown, Md., has been selected on recommendation of the War Production Board to receive the Army-Navy "E" for its "fine achievement in the production of war equipment."

Formal presentation of the "E" flag and lapel pins to employes was scheduled to be made at the company's plant April 20. Details of the ceremonies will be described in a subsequent issue.

Pangborn's production of blast cleaning and dust control equipment is entirely for war work, and employment has been increased steadily until at present it is up to four times the pre-war peak.

## Publishes Index

American Society for Testing Materials has issued its annual *Index to A.S.T.M. Standards* which contains 225 pages and lists some 1100 standards and tentative standards of the society. Standards are listed under appropriate key words, and also in numerical sequence. Copies of the index may be secured from the society headquarters at 260 South Broad street, Philadelphia.

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# Colorimetric Determination of BORON IN STEEL

By G. A. RUDOLPH and L. C. FLICKINGER
Youngstown Sheet & Tube Co.
Youngstown, O.

ADDITION of minute quantities of boron to steel in order to improve hardenability has urged the metallurgical chemist to produce an analytical procedure for the determination of boron accurate to plus or minus 0.0005 per cent. Since, in the average steel plant laboratory, duplication of analytical results in the second decimal place is considered good practice, except for phosphorus and sulphur, it readily can be seen the common laboratory practices involving gravimetric and volumetric procedures are inadequate.

Careful adherence to details for the determination of boron as set forth in the distillation-titration method[1], and modifications thereof failed in our hands to give acceptable results. This method is time consuming and requires the use in part of boron free glassware.

A search of the literature[2,3] revealed that boron in minute quantities produces a characteristic blue color with quinalizarin (1, 2, 5, 8—Tetrahydroxy-anthraquinone) in a medium of strong sulphuric acid (93 per cent by weight).

None of the ordinary elements cause any interference with the reaction, except on rare occasions manganese is found in the insoluble portion, the oxide of which, in the presence of concentrated sulphuric acid, produces oxygen which destroys the color of the quinalizarin. The addition of a small amount of sodium sulphite prevents this interference. Oxidizing substances such as dichromates and nitrates destroy the pink color of the reagent. The chromates or dichromates formed during the fusion of the insoluble portion of the steel have been investigated by the authors using steels having up to 1 per cent chromium, 1.50 per cent nickel and 0.50 per cent molybdenum. No interference was detected by these elements.

A careful analyst using the same reagents for his samples as he uses to make his standards can detect readily 0.0002 per cent boron in either the soluble or insoluble portion of the steel, giving an accuracy, or duplication of results less than 0.0005 per cent total boron in the sample.

### Use Ordinary Glass

Ordinary glassware is used. The authors use bacteria culture tubes for dissolving the sample, pyrex or plain glass funnels for filtering and 125 milliliter flint glass oil sample bottles for comparison. No contamination from any of this glassware has been encountered.

It is necessary for the analyst to have his glassware clean and dry since any dilution of the final strength of sulphuric acid influences the depth of color. A sufficient amount of the 98.5 per cent sulphuric acid and quinalizarin reagent should be made to provide a supply to last two or three months. The standard colors last almost indefinitely if kept tightly stoppered, but should be remade whenever a new supply of the 98.5 per cent sulphuric is prepared.

An experienced analyst can determine boron in 15 to 20 samples of steel in eight hours by this method.

Sulphuric Acid (98.5 per cent by weight)—To 1200 milliliters of ordinary concentrated sulphuric acid (specific gravity 1.84, 95.5 per cent) add 600 milliliters fuming sulphuric acid 20 per cent, mix well and allow to cool. This should be kept tightly stoppered while not being used. Store in a glass stoppered bottle.

Quinalizarin Solution—Dissolve 0.01 gram of quinalizarin (E. K. Co. 2787) in 100 milliliter of strong sulphuric acid made by slowly adding 9 volumes of 98.5 per cent by weight sulphuric acid to 1 volume of water. Store in a glass stoppered bottle.

Standard Boric Acid Solutions—Dis-

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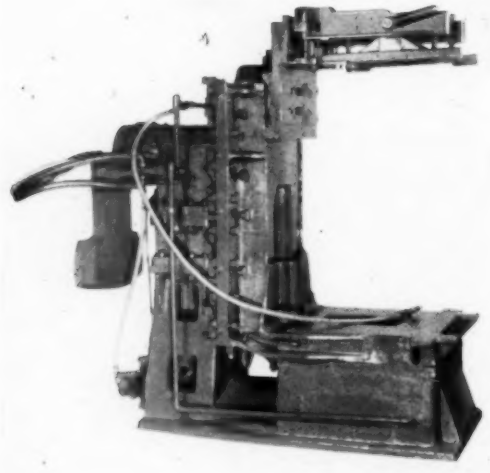

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solve 2.8578 grams of boric acid in 1000 milliliters of distilled water. This solution contains 0.5-miligram of boron per milliliter and serves as the primary (A) base stock solution. Prepare a second (B) stock solution containing 0.01-milligram of boron per milliliter by diluting 20 milliliters to (A) stock solution to 1000 milliliters with distilled water and a third (C) stock solution containing 0.001-milligram of boron per milliliter by diluting 100 milliliters of the second (B) stock solution to 1000 milliliters.

Dilute Sulphuric Acid (1-4)—To 400 milliliters of distilled water slowly add 100 milliliters of concentrated sulphuric acid, specific gravity 1.84. When cool dilute to 500 milliliters. Store in a glass stoppered bottle.

Test tubes 17 centimeters long with inside diameter 1.8 centimeters marked with a file at 10 milliliters.

Air Condensers—Glass tubes 3 millimeters inside diameter about 70 centimeters long, each fitted on one end with a No. 3 one-hole rubber stopper to fit the test tubes.

### Colors Are Permanent

Bottle for developing the color of standards and samples. Preferably glass stoppered having at least 50-milliliter capacity with inside diameter of 3 centimeters. The final solution in these bottles will have a depth approximately the same as the diameter.

After these standards are measured into dry comparison bottles, 20 milliliters of the 98.5 per cent sulphuric acid are added slowly and stoppered. When cool, 1.0 milliliters of the quinalizarin solution from pipette is added, the solution mixed by gently swirling and stoppered tightly. After 15 minutes, the colors become fully developed and are ready for use. They are permanent if kept stoppered to prevent absorption of water.

One-gram portions of Bureau of Standard sample No. 55-a or other boron-free steel are weighed into seven dry, marked test tubes and treated as indicated in Table II.

The standard represented in Table II will be completed as described in the analytical procedure.

One gram of the steel to be tested is placed in a marked test tube, 8 milliliters of $H_2SO_4$ (1-4) are added and the test tube stoppered with an air condenser, and placed in a beaker of hot water. When all action ceases, remove the test tube and cool with running water. Disconnect the air condenser, wash down the inside with two 0.5-milliliter portions of water, collecting these washings in the test tube. Dilute to the 10-milliliter mark with distilled water, mix thoroughly and filter through a close, dry, 9-centimeter paper, collecting the filtrate in a dry, small beaker or test tube. Reserve. This filtrate contains the boron which is soluble in $H_2SO_4$ (1-4).

Replace the beaker or test tube with another and wash the paper with dis-

Table I

Standards for Boron in $H_2SO_4$ (1-4) *Insoluble* Portions of Steel

| Number of Sample | Boron in colored standards, in mg. | Distilled water, in ml. | Boron "B" & "C" solutions in ml. | % Boron in sample using 0.2-g. aliquot |
|---|---|---|---|---|
| 1 | 0.0000 | 2.00 | 0.00 | Nil |
| 2 | 0.0010 | 1.00 | 1.00 (C) | 0.0005 |
| 3 | 0.0020 | 0.00 | 2.00 (C) | 0.0010 |
| 4 | 0.0030 | 1.70 | 0.30 (B) | 0.0015 |
| 5 | 0.0040 | 1.60 | 0.40 (B) | 0.0020 |
| 6 | 0.0050 | 1.50 | 0.50 (B) | 0.0025 |
| 7 | 0.0060 | 1.40 | 0.60 (B) | 0.0030 |

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**Table II**

**Standards for Boron in $H_2SO_4$ (1-4) *Soluble* Portion of Steel**

| Number of Sample | Boron in 1 gram sample, in mg. | Concentrated $H_2SO_4$ acid, sp. gr. 1.84, in ml. | Boron "B" & "C" solution, in ml. | Distilled Water in ml. | % Boron in sample using 0.2-g. aliquot |
|---|---|---|---|---|---|
| 1 | 0.0000 | 1.5 | 0.00 | 6.50 | Nil |
| 2 | 0.0050 | 1.5 | 5.00 (C) | 1.50 | 0.0005 |
| 3 | 0.0100 | 1.5 | 1.00 (B) | 5.50 | 0.0010 |
| 4 | 0.0150 | 1.5 | 1.50 (B) | 5.00 | 0.0015 |
| 5 | 0.0200 | 1.5 | 2.00 (B) | 4.50 | 0.0020 |
| 6 | 0.0250 | 1.5 | 2.50 (B) | 4.00 | 0.0025 |
| 7 | 0.0300 | 1.5 | 3.00 (B) | 3.50 | 0.0030 |


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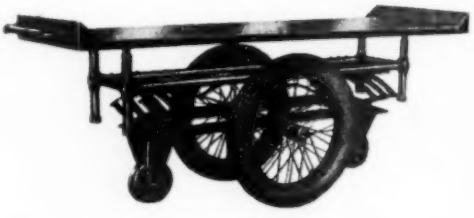

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tilled water then with dilute $H_2SO_4$ (1-20) and finally with water to remove all acid. Discard the washings. After all washings have drained from the paper, scatter 0.5-gram of $Na_2CO_3$ on the inside of the paper. Place in a small platinum crucible (about 10 to 15-milliliter capacity; a crucible used for volatile matter in coal will suffice), and ignite at a low temperature. When the paper is all or nearly all burned off, increase the temperature and fuse the residue 15 to 20 minutes. Allow to cool and add 5 milliliter distilled water, then slowly add dropwise $H_2SO_4$ (1-1) until all is dissolved and the solution is slightly acid. Avoid an excess of more than four or five drops. Transfer to a marked test tube and rinse the crucible with two 1-milliliter portions of water, add approximately 0.02-gram $Na_2SO_3$, cool and dilute to the 10 milliliter mark and mix well. This solution contains the boron which is insoluble in $H_2SO_4$ (1-4).

Pipette 2.0 milliliter aliquot of each of the two foregoing prepared portions into dry comparison bottles. Slowly add 20 milliliters of 98.5 per cent $H_2SO_4$ to each, stopper, cool and then add 1.0 milliliter of the quinalizarin solution from pipette, stopper and mix by swirling gently. The salts formed in the bottle containing the acid soluble portion will settle sufficiently for comparison after standing for an hour (preferably over night) while the color produced in the acid insoluble portion may be compared after standing 15 minutes since no salts are precipitated.

By starting smaller samples than 1.0 gram and/or by using smaller aliquots, greater percentages of boron may be determined.

**References**


[1]Hague & Bright, National Bureau of Standards, Research Paper No. 21, page 125, 1938.

[2]Berger, K. C. and Truog, E., *Industrial and Engineering Chemistry*, analytical edition, Oct. 15, 1939, pages 540-545.

[3]Smith, G. S., *The Analyst*, volume 60, page 735, 1935.



This article is taken from the April 5, 1943 issue of *Steel*.


THE EDITORS.

## Whiting Is Selected For "E" Award

Whiting Corp., Harvey, Ill., has received the Army-Navy "E" award for excellence in war production. A letter from Robert P. Patterson, Under Secretary of War, to Whiting employes stated in part that the award was made on the recommendation of the War Production Board for the fine Whiting record in producing materials for the war effort. Presentation ceremonies were held at the plant April 20.

Whiting Corp. is manufacturing electric cranes for shipyards, foundry equipment, metalworking machinery, and other products for plants producing war equipment.

## Cost Service Provided for

# GRAY IRON FOUNDRIES

GRAY IRON Founders Society has inaugurated a nation-wide cost promotion and cost service, general purpose of which is to promote use of sound cost accounting methods and a better understanding of cost accounting principles among gray iron foundries.

Issuance of OPA Maximum Price Regulation No. 244, with its requirement that every gray iron foundry must determine maximum prices for certain castings by a specific pricing formula, makes it imperative that every foundry have a sound cost formula. One of the objectives of the program is to make it possible for every gray iron foundry to obtain a simple cost formula to meet this need at minimum cost.

The society has arranged to make its cost service available to every gray iron foundry, member or nonmember. An important feature of the program is a plan to render various types of cost service by mail based upon data submitted by mail. To insure that such data will be treated confidentially, the cost service will be handled by an independent consultant from his own office in co-operation with the society.

Heading the cost program is John L. Carter, a foundry cost consultant who has also been a foundry manager, and who is well known for his activities in foundry cost accounting, and as former special consultant to OPA on gray iron foundry matters.

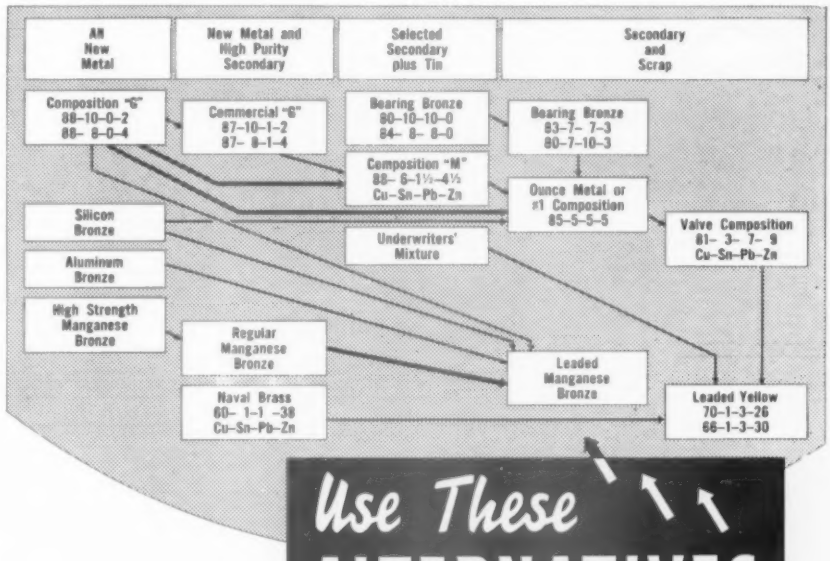
The cost program was formulated by a committee consisting of the following foundry executives: C. R. Culling, president, Carondelet Foundry Co., St. Louis; H. L. Edinger, vice president, Barnett Foundry & Machine Co., Irvington, N. J.; Don McDaniel, vice president, Hamilton Foundry & Machine Co., Hamilton, O.; C. B. Magrath, president, Greenlee Foundry Co., Chicago; H. S. Washburn, president, Plainville Casting Co., Plainville, Conn.

Included in the program will be a series of mailings describing the cost services available to all gray iron foundries; distribution by mail of articles on various phases of gray iron foundry cost accounting and on compliance with government price regulations; local meetings on foundry costs; and the appointment of a local cost committee in every foundry center, as far as possible, to assist the society in promoting the cost program in that area.

The simple cost formula to be made available by mail to any foundry, even though it has never had a cost system, will be based on data furnished confidentially by mail to Mr. Carter. Practically any foundry will be able to supply the required information with but little clerical work. The cost formula furnished would give fairly accurate costs and would involve no clerical expense except that involved in using the formula to figure job costs. It would provide the basis for a pricing formula suitable for filing with OPA to meet requirements of MPR No. 244.

Another mail service offered is a "Report on Cost Methods". This will be based on information submitted by mail on forms provided for this purpose, giving a full description of the foundry's cost methods, class of work handled, etc. The report will point out flaws, if any, in the foundry's cost system; indicate possibilities of errors in arriving at costs; make recommendations for revisions in methods, etc. Other types of cost service by mail are under consideration and will be announced later. The society also offers personal consulting service involving a visit to the foundry.

A moderate charge will be made for the various types of service, charges to society members being on a lower scale than those to nonmembers. Additional information on the cost services may be obtained from the society's consultant, John L. Carter, 30 Central Avenue, Newark, N. J.



All New Metal
New Metal and High Purity Secondary
Selected Secondary plus Tin
Secondary and Scrap
Composition "G" 88–10–0–2 88– 8–0–4
Commercial "G" 87–10–1–2 87– 9–1–4
Bearing Bronze 80–10–10–0 84– 8– 8–0
Bearing Bronze 83–7– 7–3 80–7–10–3
Composition "M" 88– 6–1½–4½ Cu–Sn–Pb–Zn
Ounce Metal or #1 Composition 85–5–5–5
Silicon Bronze
Underwriters' Mixture
Valve Composition 81– 3– 7– 9 Cu–Sn–Pb–Zn
Aluminum Bronze
High Strength Manganese Bronze
Regular Manganese Bronze
Leaded Manganese Bronze
Naval Brass 60– 1–1 –38 Cu–Sn–Pb–Zn
Leaded Yellow 70–1–3–26 66–1–3–30

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•

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Ajax Plastic Bronze
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Ajax Manganese Copper
Ajax Aluminum Alloys
Ajax Phosphor Copper
Ajax Silicon Copper
Ajax Nickel Alloys
Ajax Phosphor Tin

**NOTE**

*"Proper Melting Decreases Foundry Losses," contains interesting data. Also, the booklet, "Nonferrous Ingot Metals of Today." Write for both of these. They are free.

Notice how the arrows on the W.P.B. chart point to the *right*. . . . They show how alternative materials *currently available* can be utilized by foundrymen as now permitted by many designers. The purpose is to conserve primary metal at the mine through increased use of secondary ingots. Sometimes great ingenuity is called for, yet remember this:

The first program for scientific control of ingot metal was set up by Ajax 45 years ago. The result has been metal and practical technical follow-through in which Ajax increases your production by reducing rejects.

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ESTABLISHED 1880 PHILADELPHIA

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AJAX ENGINEERING CORP. Ajax-Tama-Wyatt Aluminum Melting Induction Furnaces

# FOUNDRY ACTIVITIES

ANNUAL meeting of the Vulcan Mold & Iron Co., Latrobe, Pa., was the occasion of a celebration of the company's twentieth anniversary. The company was founded in March, 1923, by the late Col. E. H. Williams. Initial operations were on a small scale with only a few employes and customers. Growth was gradual for the first 10 years, or until 1933. In 1932, when Colonel Williams died, Edward R. Williams, a son, became president. Rapid expansion in operations began shortly thereafter.

Vulcan employes, acting as guides, took parties of men and women on an inspection trip through the plant to witness manufacture of ingot molds and special molds used by steel, aluminum, brass and copper producers in making war materials. Of special interest was the making of large alloy molds used in centrifugal casting of cannon and anti-aircraft guns. After the trip the guests assembled in the employes new lunchroom where a buffet lunch was served.

° ° °

Rogers Pattern & Foundry Co., 938 East Sixtieth Street, Los Angeles, is building an addition to its plant.

° ° °

C & G Foundry & Pattern Co., 2440 Yandes Street, Indianapolis, was damaged by fire recently.

° ° °

Nordberg Mfg. Co., Milwaukee, has let contract for a one-story factory addition.

° ° °

Allyne-Ryan Foundry Co., 8916 Aetna Avenue, Cleveland, is expanding furnace room facilities.

° ° °

Matthews Foundry, 2228 Railroad Avenue, Fresno, Calif., has been organized by P. I. Matthews.

° ° °

Defense Plant Corp., Washington, has acquired factory site near Baltimore for manufacture of magnesium sand castings.

° ° °

Key Co., East St. Louis, Ill., has plans by O. D. Conover, Cleveland, for foundry, pattern shop, service and office buildings.

° ° °

Sundstrand Machine Tool Co., Rockford, Ill., has been granted contract by the Defense Plant Corp. to provide additional plant facilities.

° ° °

Howard Foundry Co., Chicago, has received from the Defense Plant Corp. a contract to provide additional plant facilities.

° ° °

North American Aviation Inc., 5701 Imperial Highway, Inglewood, Calif. is making alterations and improvements to its foundry plant.

° ° °

American Brass & Aluminum Foundry Co., 2412 South Santa Fe Avenue, Los Angeles, has been organized by Tony Orpallo.

° ° °

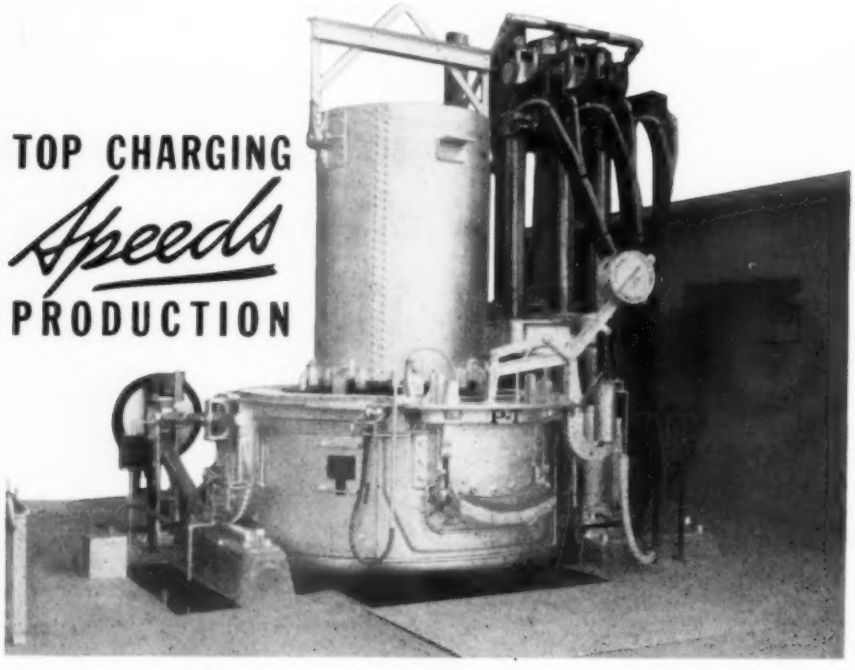
Wellman Bronze & Aluminum Co., 6107 Superior Avenue, Cleveland, is erecting an addition to its plant to improve its heat treating facilities.

° ° °

Progress Pattern Co., 1457 Marshall Avenue, St. Paul, plans a large addition to its plant to be used for coremaking and casting of magnesium.

° ° °

Index of new foundry equipment orders for February, according to a report of the Foundry Equipment Manufacturers' Association, Cleveland, was 348.1 as com-

TOP CHARGING *Speeds* PRODUCTION

The top charge feature of Lectromelt Furnace increases steel tonnage through its simplicity and economy of operation. Movement of one valve lifts and swings aside the roof, superstructure and electrodes for quick loading on the furnace hearth with a crane positioned drop bottom charge bucket as shown in the above photograph of a 3 ton per hour size "PT" Lectromelt.

Operating economies for the top charge type include lower power consumption and savings in electrode and refractory costs. They are ideally suited for bulky open charge type of low cost scrap, which melts with good efficiency and low power usage. The size of scrap is limited only by the diameter of the furnace crucible.

Lectromelts are ruggedly built to give long and satisfactory service. Top charge type is available in standard sizes from 100 tons down to 250 pound capacity.

MOORE RAPID *Lectromelt* FURNACES

PITTSBURGH LECTROMELT FURNACE CORPORATION
PITTSBURGH, PENNA.

pared with 394.9 in January. Index for repairs was 554.4. Index of 100 represents the monthly average of reported sales to metalworking industries during 1937-38-39.

° ° °

Renfrow's Gray Iron Foundry, 4913 San Fernando Road, West Los Angeles, Calif., is the company name under which Alven R. Renfrow intends to conduct business.

° ° °

Acme Foundry & Machine Co., Springfield, Mo., has been organized by S. H. Vienhage, Rose Vienhage and S. H. Vienhage Jr. to be operated as a foundry and machine shop.

° ° °

Crucible Steel Casting Co., 2850 South Twentieth Street, Milwaukee, will build factory addition. R. W. Dwyer, 5617 West Washington Boulevard, is architect.

° ° °

General Castings & Mfg. Co., 2333 Enterprise Street, Los Angeles, is the firm name under which Louis W. Miller and Lewis Davis intend to conduct business.

° ° °

Newport Foundry & Mfg. Co., Newport Beach, Calif., has been incorporated by G. Fuller Peters, C. E. Ackerman and Edgar R. Hill, all of Newport Beach.

° ° °

St. Paul Foundry Co., St. Paul, Minn., operating for 80 years under that name, has changed its name to St. Paul Engineering & Mfg. Co. in order to represent better its present scope of activity.

° ° °

National Aluminum Mfg. Co., Peoria, Ill., has sold its present plant to R. G. LeTourneau Inc., Peoria, and is transfering its activities to a farm tool plant it has purchased. The new plant will permit expanded operations.

° ° °

American Brake Shoe & Foundry Co., Ramapo Valley Road, Mahwah, N. J., has let contract for one and two-story foundry buildings to J. H. Steele & Son Inc., 48 North Second Street, Paterson, N. J.

° ° °

Home Aluminum & Bronze Co., 800 South Downing Street, Piqua, O., has been purchased by Delbert J. Francis, formerly of Sidney, O. The plant had been operated for a number of years by the late Clarence J. Bartel.

---

Nitralloy Corp., 230 Park avenue, New York, has published a 99-page booklet entitled, "Nitriding Furnaces" which discusses constructional features, capacities, operation and instrumentation. The booklet is divided into 4 parts dealing with nitriding and nitriding furnaces, ammonia and its handling, determination of furnace size for nitriding, and instruments for measuring ammonia flow, etc.

## Attacks Off-the-Job Accident Toll

Striking at a major cause of plant absenteeism, the National Safety Council has launched its most ambitious campaign against off-the-job accidents. Col. John Stilwell, president of the council, points out that last year 29,000 workers met death away from their jobs, against 18,500 killed at work, while of 4,100,000 non-fatal injuries to workers more than 57 per cent occurred off the job.

As part of the campaign, the council has produced a series of new publications aimed specifically at this type of accident. These include leaflets, posters, films and pamphlets for distribution to management and workers. Additional copies may be obtained from the council, 20 North Wacker Drive, Chicago.

---

## Moves Headquarters

Meehanite Metal Corp. and the Meehanite Research Institute of America Inc. have moved their headquarters from Pittsburgh to Pershing Building, New Rochelle, N. Y. The new headquarters include enlarged laboratory and research facilities.

PRECISION METALLURGICAL TESTING EQUIPMENT
AB LEAD LAPPING DISC for producing extreme flatness in polishing difficult metal specimens with a minimum of disturbed metal.
EYE SHADE MAGNIFIER—Large clear field—magnification 2¼ times. Quick change to normal vision by simply pushing up on forehead.
AB DE LUXE POLISHING MACHINE combines maximum convenience with precision polishing. Built in wash fountain—air blower for drying—desiccator compartment for sample preservation.
B. & L. WIDE FIELD BINOCULAR. Affords a wide field of realistic three-dimensional vision. Shown with B. & L. reflector lamp.
APLANATIC FOLDING MAGNIFIERS Single lens—6-power.
SPECIMEN MOUNT PRESS No. 1315, provides utmost ease and speed in molding and cooling bakelite and transoptic mounts, either 1" or 1¼" size. Built for extreme accuracy and long service.
Double lens type with 6- and 3-power lens. 9-power when combined.
B. & L. FOLDING MAGNIFIER in metal case. 7-power.
A complete line of equipment for the Metallurgical Laboratory . . .
SPECIMEN MOUNT PRESSES—POLISHERS—POLISHING ABRASIVES POLISHING CLOTHS—POWER GRINDERS—BELT SURFACERS—CUT-OFF MACHINES—HAND GRINDERS—CARBON METERS—COLORIMETERS HARDNESS TESTERS—DILATOMETERS—DUST COUNTERS—EMERY PAPER GRINDERS—LABORATORY CHAIRS—TITRATORS—MAGNIFIERS METALLOGRAPHS—MICROSCOPES—STEREOSCOPES—PYROMETERS PH METERS—REFRACTOMETERS—SPECTROGRAPHS—MACRO CAMERAS
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## Obituary

ERNEST E. WANGELIN, 73, president-founder, Century Brass Works, Belleville, Ill., died in Belleville, March 14. Mr. Wangelin founded the company 25 year ago.

° ° °

Percival J. Myall, 63, sales manager, Fisher Furnace Co. Inc., Chicago, died April 4 at his home in Glenview, Ill. Mr. Myall was a native of Lowestoft, England, and at one time was engaged in commercial heat treating with the Myall-Wallace Co., Chicago. For more than 15 years prior to 1932 he served as Chicago sales representative and engineer, Tate-Jones & Co. Inc. He had been associated with Fisher Furnace Co. since 1935.

° ° °

George H. Stevens, a coremaker for 41 years at National Malleable & Steel Castings Co., Indianapolis, died at his home in that city, March 14.

° ° °

Edward J. Fleming, 72, president, Fleming Foundry Co., Springfield, Mass., died recently in Jacksonville, Fla. Mr. Fleming was born in Ireland, and settled with his parents in Taunton, Mass., at an early age. He began his career as an iron molder there and then went to Springfield in 1900 to take charge of the old Davitt Iron Foundry. Nine years later he founded his own company.

° ° °

Harry C. Weiskittel, 73, president, Harry C. Weiskittel Co. Inc., Baltimore, manufacturer of cast iron soil pipe, fittings and gas ranges, died at his home in Baltimore March 24. Mr. Weiskittel entered the foundry industry in 1885, working for his father who operated A. Weiskittel & Son Co., Baltimore. He was vice president of that company at the age of 21. In 1930, Mr. Weiskittel with his two sons, Anton K. and Harry C. Weiskittel Jr., organized his own company and erected a plant on a 25-acre plot in Baltimore.

° ° °

Edward A. Pridmore, 61, president, International Molding Machine Co., Chicago, died March 29, in Chicago. Mr. Pridmore attended Lewis Institute and on completing his course, entered

*Edward A. Pridmore*

the business of his father, the late Henry E. Pridmore, manufacturer of Pridmore molding machines. On the death of his father in 1908, Mr. Pridmore organized the International Molding Machine Co. of which he was president for 35 years. Mr. Pridmore was a well known authority on foundry methods and equipment, and designed much of the high production machinery used in foundries. Two sons, Harold E. and Lawrence D., have been associated with him in the business for a number of years.

° ° °

Christian H. Stoelting, 78, president, C. H. Stoelting Co., Chicago, died in Chicago, March 18.

° ° °

W. D. Kennedy, 58, founder of the Kennedy Machine & Brass Co., Dallas, Tex., died in Dallas, March 17. Mr. Kennedy organized the company in 1928.

° ° °

G. W. Everett, 77, a retired employe of Central Foundry Co., Bessemer, Ala., died recently at his home in Bessemer. Mr. Everett has been associated with the company for 25 years.


DETROIT ROCKING ELECTRIC FURNACES

FOR BRASS AND IRON FOUNDRY USE

Detroit Furnaces insure rapid melting speed, low metal losses, less labor and saving in floor space. With this furnace you can run a variety of mixtures, 1 or 2 heats an hour, large or small. For increased production at lowest net cost and unequalled operating flexibility, this versatile melting unit simply cannot be beaten. Write for facts.

DETROIT ELECTRIC FURNACE DIVISION
KUHLMAN ELECTRIC COMPANY • BAY CITY MICHIGAN

# CENTRIFUGING AFTER MOLD IS FILLED

(*Continued from page* 93)

riser will give solid castings with over 90 per cent yield. When the bore is too small for this type of gate, that shown in Fig. 2 is used. Fig. 8 shows the drag of a mold on a centrifugal table of the type of gear shown diagramatically in Fig. 1. The center head and gate core shown in Fig. 1 is in place. This core making the bore contains the pool of liquid metal required to feed the casting and also the gate. Fig. 6 shows the same casting after shake-out.

Fig. 2 shows a spoke type gear of somewhat unusual design using a different type of gate core due to the fact that the inside diameter of the bore is too small to take the combined head and gate core shown in Fig. 1. Note that the spokes are appreciably larger than those called for by normal design. Again their dimensions are established by the necessity of keeping their interior sufficiently liquid to supply metal to the rim until it has solidified. Two cores are used. One being the center core making the bore and containing the downgate. A standard pouring cup is then placed on top of this core. As the metal rises up to the level of this pouring cup, it floats and continues to float on top of the metal until the head is completely filled, leaving a solid pool of liquid metal in the riser.

### Larger Spokes Necessary

Fig. 7 shows a similar gear after sectioning, illustrating the result of proper and improper design. This figure shows the effect of too small channels from the hub to the rim and shrinkage voids at the base of the teeth when they are cut. The proper design shows the same gear with slightly larger spokes as feeding channels and a solid rim. It may seem at first that the increased size required for the feed channels would be objectionable in that they increase the weight of the casting. On the contrary, a properly designed casting for the centrifugal process will weigh less than that predicated by normal design.

For example, the improperly designed casting shown in Fig. 7 weighed 150 pounds as a web gear. Changing the design from a web gear to a spoke gear with larger cross-sectional areas in the spokes as predicated by centrifugal design, instead of increasing the weight, decreased the weight to 132 pounds, an actual decrease in weight of 13 per cent. Of course, a spoke type design is necessary if the weight is to be reduced to a minimum. This type of design is suitable for the great majority of applications. The only time a web type gear is necessary is if the casting is to be severely quenched after machining, and quenched to such a high hardness that it cannot be recut after heat treatment.

As the solidity of the rim depends on the relation of the area of the feeding channels to the area of the rim, it is necessary to establish this relation quantitatively. Gears with various ratios of channel to rim area were made and radiographed to establish not only the solidity of the gear, but also the position of the shrinkage. In all, over 100 gears were studied. Typical results are given in the accompanying table.

It can be seen from this table that the cross-sectional area of the channels, whether they be spokes or enlargements of the web, must be very nearly equal to the cross-sectional area of the rim in order to make a radiographically sound gear. However, this ratio can be increased to 1.2 to 1 before the area showing shrinkage extends into the rim. As the area of the feeding channel is larger than that called for by design there is no reason why shrinkage in the center of these channels would be objectionable. The ratio of 1.2 to 1 between the cross-sectional area of the rim and that of the feeding channels can then be used for all structural castings cast by this method. If for any reason radiographically sound castings are required, the ratio of the cross-sectional areas would have to be increased to 1 to 1.

This relationship holds only under definite limits. Of course, the center

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CHECK THESE MACHINES
Get the full story on Delta machines today! The complete Delta line for the foundry machine shop includes single and multi-spindle 14" and 17" Drill Presses, Abrasive Finishing Machines, Metal Cutting Band Saws, Cut-Off Machines, Grinders, Carbide Tool Grinders and Surface Grinders.
Also—for the pattern shop—there is a full line of Delta quality low-cost Circular Saws, Jointers, Shapers, Scroll Saws, Lathes, Sanders and Wood-Cutting Band Saws that are stepping up pattern shop output in many hundreds of shops from coast to coast.
SEND FOR CATALOG giving full details and prices on the complete line of Delta low-cost machines for foundry machine shops or pattern shops. Get in touch with nearest Delta Industrial Distributor or send coupon below.
DELTA MILWAUKEE
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Gentlemen: Please send me latest Delta Catalog giving full specifications and prices on Delta metal and woodworking machines.
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riser must be large enough to supply liquid metal until the casting solidifies. The volume of this riser when poured should be not less than 15 per cent of the volume of the casting. There is also a definite limit to the length of rim between feed channels. If not enough channels are used the solidity of the junction of the channel and rim will be governed by the ratio given in the preceding paragraph, but shrinkage will be encountered in the rim between the feed channels. If the section is uniform and there are no hot spots, this shrinkage will be found, not equi-distant between the feed channels but at two points, one-third and two-thirds this distance. Although radiographic studies of this phase are not complete at present, it seems that the distance between feed channels should not be greater than that established by the following equation. $D = 10T + 10$. When D equals distance between feed channels, T equals thickness of section between feed channels.

Another variable affecting feeding through these channels is length; that is, the distance between the center riser and hub and the rim. With distances between the outside diameter of the hub and the inside diameter of the rim less than 4 inches, no trouble will be encountered with feed channels of uniform cross section. With greater length it is necessary to pad or taper these channels in order to use directional solidification. Here, again, the radiographic study is incomplete but tapering feed channels ¼-inch per foot will give visual soundness up to 15 inches between the outside diameter of the hub and the inside diameter of the rim. We have not studied greater distances as the gear then becomes too large for our centrifugal tables.

These limitations again place definite limits even to gears to be cast by this process. Large gears with very heavy rims present the most difficult problem. Not only do they require large rigid machines, but the large cross-sectional area of the rim requires such large feed channels that they become unwieldy from the design standpoint. If we rule out very light gears that solidify before they can be spun, we have this process limited to gears or other similar castings weighing from 10 to 1500 pounds, with an outside diameter of 8 to about 60 inches.

The process of centrifugal castings around a vertical axis after the mold is poured is shown to have definite advantages in controlling shrinkage occurring during solidification, increasing yield and decreasing cost.

No increase in density or physical properties of sound metal cast centrifugally over sound metal cast statically using normal atmospheric and hydrostatic pressure has been found.

Equipment for the process is simple and consists of a table supporting the flask and mold, supported by suitable bearings, being rotated by any suitable means.

Design is very important if advantage is to be taken of centrifugal force to control solidification shrinkage, and increase the yield appreciably. Details of design of one type of casting, blank gears, are given.


**Reference**

(1) H. F. Hall, "Strength and Ductility of Cast Steel During Cooling from the Liquid State in Sand Molds." *Second Report*, Steel Castings Research Committee, British Iron and Steel Institute. Page 65.

In step with the country's effort to conserve critical materials, Industrial's engineers (recognized as pioneer developers of dust collectors and grinding booths for magnesium) introduce this new orifice type dust collecting unit.

Like other Hydro-Whirl models, it is very efficient—yet it has only one mechanical moving part: a fan unit.

Dust laden air is drawn through an orifice. The violent action of the water spray thus produced causes the dust to be "water-whirled" out of the air and knocked down into a tank below, where it forms a sludge which can be easily removed. The cleaned air may be returned to the room, effecting a worthwhile saving in building heating costs.

The addition of this unit to our line now provides 3 distinct Hydro-Whirl types, enabling you to go to one source to solve practically any dust problem you may have.

This new unit is available in either booth type (as shown) or individual collectors for grinding stands.

HYDRO-WHIRL

**INDUSTRIAL EQUIPMENT CORPORATION**

formerly Industrial Sheet Metal Works

625 EAST FOREST AVENUE • • DETROIT, MICHIGAN


## Describes Detection Of Toxic Gases

Information on a method detecting the toxic oxides of nitrogen that imperil the health of persons working in contaminated atmospheres of industrial plants in which these gases are produced, has been assembled by the Bureau of Mines.

These oxides of nitrogen "occur in the gases evolved in the use of explosives, in the gaseous products of welding operations, in the exhaust of internal-combustion engines, in the vicinity of electrical discharges, in the combustion of nitrated materials, and in chemical processes involving nitration or the use of nitric acid," according to the chemists' report on their investigation. Copies of the report are available from the Bureau of Mines, Washington.

# WINNING THE WAR— THEN WHAT?

(*Continued from page* 94)

have been so traditionally reluctant to really *sell* their product on anything like the plane of other industries.

The time is present right now to think and plan for the postwar industrial phase. I am convinced that an industry which has shown the progress and accomplishments in methods of production, both scientific and technical, achieved by the foundry industry, can if it will, also do an outstanding job of merchandising its product. The leaders of the industry should be thinking selling, actively and aggressively, with full emphasis on the best talent obtainable.

Whether this is possible co-operatively across the entire foundry industry as is done in other industries, I am not prepared to say. Experience seems to indicate that it is impossible. If such is the case, let the various branches start toward the desired goal by doing a job individually but to the point of refraining from casting aspersions within the foundry camp. There is too much to be done to catch up with welding, stampings and other competitive constructions, to waste energy by swinging on one another within the foundry industry.

### Planning Not Unpatriotic

Until recently, it was considered not cricket, if not unpatriotic, to think of planning for the future. Our job as manufacturers was definitely indicated to us to keep producing more, more and more of everything to hasten the day when the United Nations could assume the war initiative. We were enjoined to forget future planning and thinking. Recently there has come a change in this direction. It is again respectable for manufacturers to engage in their customary, necessary practice of planning for the future.

It is interesting to note in passing that politicians, social reformers, farmers, labor unions and other groups have been planning plenty all through our war effort and are continuing today. An important thought is that if business does not do some planning of its own and have some things ready to present, we may find others have assumed to do the job for us.

A favorable attitude of the federal administration toward planning is indicated in its tacit support of that planning group known as The Committee for Economic Development, recently established in Washington.

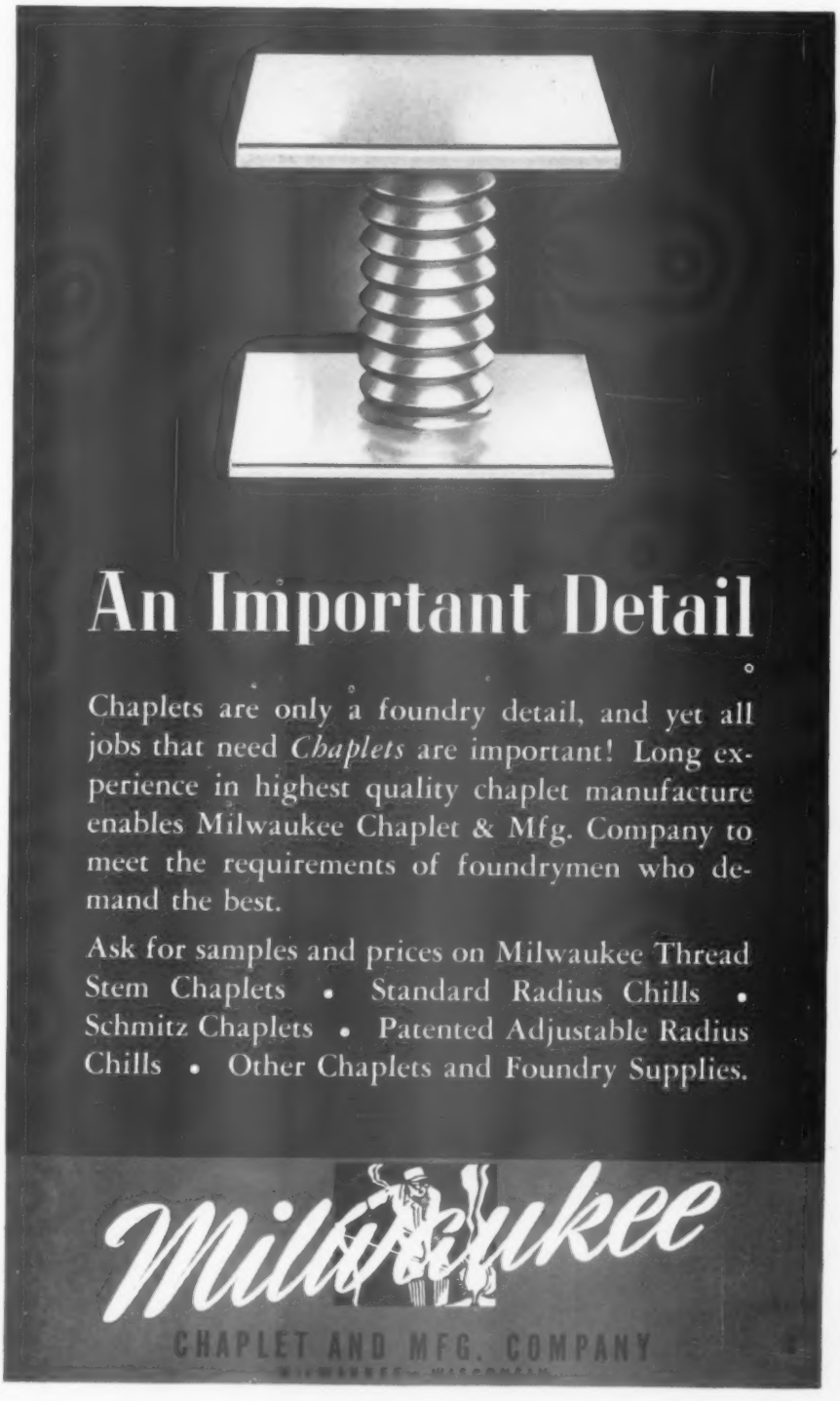
The particular problems which confront the foundry industry are the selfsame problems which others faced in the past. Other groups have been compelled to solve these very problems or disintegrate. Each one of them found the answer in the advantages of intelligent, co-operative effort—in doing a more constructive selling job on the part of the entire industry with recognition of certain outstanding needs and in the determination to conquer those needs through joint co-operation.

It is outstanding to note that wherever one finds a successful foundry, one finds an organization which has done two things — improved its product to the highest degree possible, then set out to do a constructive merchandising job.

The lesson is clear. It is possible to stimulate demand by making known the desirable features in a product or type of construction. It is possible to counteract successfully the factors which threaten the prosperity of an industry. It is possible to regain a position of national leadership through unified action.

In the nation-wide struggle for markets the efforts of the strongest individual concern are powerless. Only through complete co-operation can an industry make its bid for the buyer's dollar. The story of what American industry has done through co-operative action is one of the most fascinating and brilliant pages in our industrial history.

With the close of the war we shall witness an entirely different type of competition than was prevalent some years back. More than ever the individual concern will no longer be competing with an individual competitor.



An Important Detail
Chaplets are only a foundry detail, and yet all jobs that need *Chaplets* are important! Long experience in highest quality chaplet manufacture enables Milwaukee Chaplet & Mfg. Company to meet the requirements of foundrymen who demand the best.
Ask for samples and prices on Milwaukee Thread Stem Chaplets • Standard Radius Chills • Schmitz Chaplets • Patented Adjustable Radius Chills • Other Chaplets and Foundry Supplies.
Milwaukee
CHAPLET AND MFG. COMPANY

Rather he will be competing with another industry seeking to replace his markets with its material.

We shall be witnessing the battle of the giants. Along battlefronts we shall find industry against industry. The individual company will be as powerless as the individual soldier in modern warfare. Let us consider a few instances so that we may more clearly recognize how we, too, can meet the situation which will be confronting us.

The automobile manufacturers years ago realized that many problems confronted their industry. Co-operation has solved them in a beautiful way. Some of the many things which the automobile manufacturers have successfully accomplished through co-operative effort are: (1) a huge road building program throughout the country to furnish a place on which their products can operate; (2) a patent pool through which new developments in the industry were made available to all manufacturers. Result? A universally improved product and, what is of greater importance, your automobile dollar bought more than at any time in the history of the industry. This in the face of the highest cost labor and raw materials which the industry has ever seen.

Not so many years ago the ice manufacturer was confronted with the loss of his market to mechanical refrigeration. At that time 2000 ice producers met. Their faces were worried and anxious. Before each one in letters a mile high, shrieked the announcement that one million electric refrigerators would be put in the homes of the land that year. A billion-dollar industry wondered as to the future. Here was competition stark and brutal, threatening the theory that only ice could cool.

Someone suggested that they might sell ice instead of peddling it. He pictured 20 million families owning automobiles, 16 million using telephones and only 12 million with ice-boxes. A fund was raised for market research and promotion. Millions of pamphlets were distributed on the proper care of food. The ice man suddenly became courteous—he no longer left a trail of water on the kitchen floor.

A giant industry awoke. Trade association leaders restrained hot-heads from foolish comparisons—"those new-fangled contraptions explode; they wilt lettuce; are not foolproof; always need a mechanic." The industry instead sold ice and did not unsell refrigeration.

### Industry Revived

Result: The 12 months following, despite a cooler summer, showed a 7 percent increase in sales of ice.

But there was something more significant than material benefits. At that time the president of our largest ice company, announcing that the past 9 months had been the best period in its history, added:

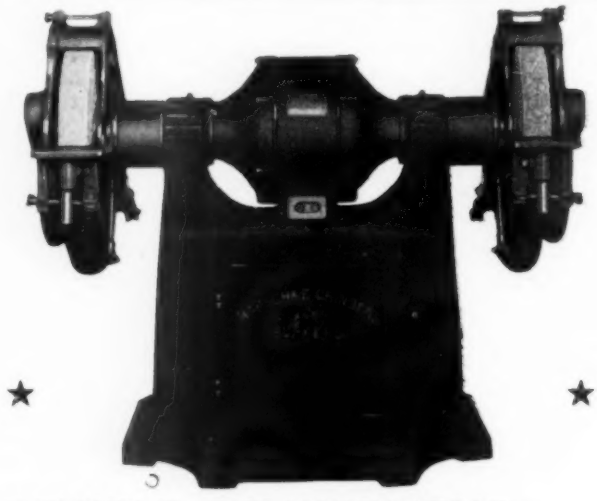
"When the electric people arrived, we got busy; we cleaned house, we cut out the dead wood and the lazy unprogressive personnel. We worked out our distribution more effectively and we added more customers constantly."

There is more to this story of ice that the president of this large ice company did not mention—that is, the fact that their profits increased beyond their own expectations. These examples of what has been done in the past are used to indicate what it is possible to accomplish when the facts are realized and most of the members of an industry are convinced there is hope ahead.

I just feel that many of you are thinking something like this: "All this talk of selling does not apply to me personally. Others in my company are being paid to do that job." That is where the foundry industry makes a big mistake. Selling is the job of everybody in an industry. When all those in the foundry industry reach the position where selling is uppermost in their minds, as is the situation in profitable successful industries like automobiles, an important achievement can be recorded for your industry.

What, you say, minimize technical phases of casting manufacture? No, sir, I say. Bring selling up to a comparable plane with technical thinking. Until you do, you and your industry will lag and suffer.

It has been my privilege over the years to assist certain industries with their business problems. This consulting work has brought me in contact

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With a Single Action!

You will prefer the MARSCHKE FLOOR STAND GRINDER With Universal Guard wherever you can use a medium sized heavy duty grinder with direct drive single wheel speed. You will be pleased, particularly with the patented Marschke Universal Guard because it is so constructed that the spark shield—over wheel opening—is brought automatically into proper relation with the wheel whenever the work rest is moved to follow wheel wear. The double adjustment resulting from a single action makes for speed and convenience of operation . . . and even more important, it makes for safety without worry as to whether operator has neglected the spark shield adjustment. This single adjustment is made with permanently attached handles and screws—eliminating lost time looking for and applying wrenches.

Distance between wheels and between base and wheels provide clearances for handling long and irregularly shaped work pieces.

Its four bearings are well supported upon the massive base to assure permanence of accurate alignment—with true, smooth spindle rotation which gets maximum use out of high priced wheels.

Yes, you will like this Marschke Floor Stand because it is safe, speedy, versatile and dependable. Write for Catalog to . . .

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rather intimately with something over 20 industries. In working with companies, talking with their executives and employees, I am struck with the enthusiasm these people hold for their product. By contrast, the people in the foundry are veritable shrinking violets.

What is the outstanding feature in conjunction with the success of the joint effort of the many industries which had improved their lot by the employment of recognized methods in merchandising their product? It is very simple. It can be summed up in one word, namely, co-operation.

Too many people who call themselves business men look upon co-operation as something which runs one way only with themselves on the receiving end.

Now is the time to evaluate the entire situation and make plans to be made effective with the close of the war. The story is told that after Pearl Harbor, it was generally accepted that our Navy had survived the worst naval disaster of all our history, immediately following which we took the offensive. Our naval command took for its own the deathless remark of Marshal Foch at the Marne: "My center is giving way, my right is broken. Situation excellent. I attack."

This same spirit exemplified by castings manufacturers can have but one result and that is the result you would all like to enjoy!

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From a paper presented before the Northeastern Ohio Chapter of the A.F.A. at Cleveland, Feb. 11. In the fore part of his talk, Mr. Tuscany pointed out that lack of more universal recognition of importance of the foundry industry is caused by its inability to tell its story to engineers, production men and the public. He also criticized the industry's laxity in handling priorities matters and urged foundries to supply the highest priority rating available in purchasing equipment and supplies.

— The Editors.

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## School Plans Summer Management Course

A three-week management course will be conducted by University of Iowa's College of Engineering at Iowa City, June 7 to 25. It will be devoted to the study of production planning, plant layout, motion and time study, wage incentives and related subjects, and is intended for plant managers, foremen, industrial engineers, methods and time study analysts, cost accountants, etc.

This will be the fifth year for the university's summer management course which is part of a nation-wide program for training men for war industries. The course will be directed by Ralph M. Barnes, professor of industrial engineering, to whom registration and communications concerning the course should be sent. Tuition and laboratory fee is $75.

---

Standard Mfg. Co., Corning, N. Y., has moved to its new plant in Big Flats, N. Y., and the name of the organization has been changed to Hungerford Corp.

## Copper and Copper Alloy Standards

American Society for Testing Materials, 260 South Broad street, Philadelphia, just has published a 385-page book containing all the society's standards on copper and copper alloys in their latest improved form as of February, 1943. The standards cover cast and wrought materials, and of the 85 presented 16 relate to cast copper-base alloys for sand castings. Others cover copper and copper-alloy wire and cable for electrical conductors; nonferrous metals used in copper alloys; copper and copper-alloy plate, sheet and strip; copper and copper-alloy wire, rods, bars and shapes; copper and copper-alloy pipe and tubes. The book concludes with methods of test for copper and copper alloys. Copies of the book may be obtained from the society for $2.25.

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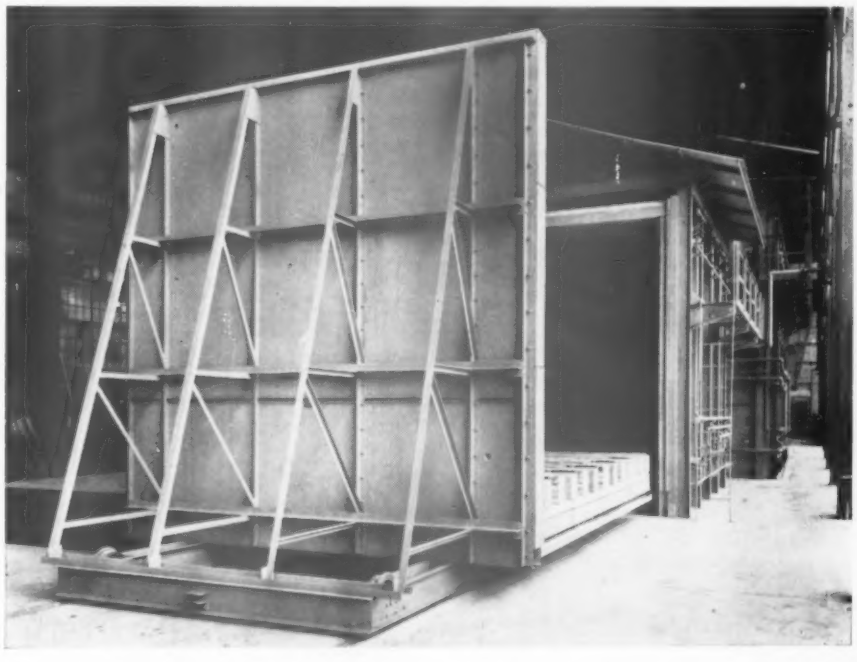
## Issues New Catalog

Link-Belt Co., 307 North Michigan Avenue, Chicago, has completed a new 180-page general catalog of standard equipment. Representative types and sizes of power transmission and materials handling equipment are included, and preference has been given throughout to the more adaptable designs.

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*With Improved Firing and Control Features*

A new method of direct firing, in the Vulcan Car Hearth Furnace illustrated above, produces a convection effect and provides greater efficiency and economy in the heat treatment of castings and weldments. Advantages: Less time to uniformly heat the charge to temperature; better uniformity at temperature; more rapid, uniform rates of heating, even when charge is not uniformly loaded in furnace; elimination of localized high temperature areas, thus reducing furnace maintenance and lengthening furnace life. Oil or gas fired, with several zones of control.

Send for complete information about this and other Vulcan custom-built furnaces for Annealing, Normalizing, Stress Relieving and other Heat Treating Operations; Forging, Melting and Special Heating work.

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# CONSERVING FOUNDRY REFRACTORIES

(*Continued from page* 95)

ing is necessary in the melting zone, and the lining in the well should be carefully examined. Clean walls are the first essential in good relining. Any humps that may have been formed above the tuyeres should be removed. We know it is difficult to chip off every particle of slag adhering to the burnt lining, but the more nearly complete the job is done, the better the patch will be able to protect the lining during the next heat. If the slag is not removed it will melt and carry the patch down with it. All holes in the lining should be plugged with brick or refractory patching mud described later on. With proper cupola operation the scoring of the brickwork in the melting zone should be even and clearly defined.

Those foundries melting high tonnages of hot iron will find it necessary to use 9 x 6 x 4 cupola blocks for patching. Smaller foundries can use 9-inch straights, 1¼ splits, or refractory daubing mud. Do not throw away the pieces of block removed from the lining as they can be used in making daubing materials.

For many years we have emphasized the necessity of using good refractory daubing mud and yet we still find some foundries who use river sand, molding sand and other low fusing materials for this purpose. Those foundries always complain about not securing satisfactory service from their block linings, and it is no wonder. Daubing mud should be made from those materials which will actually preserve and protect the lining. Mixtures of fire clay with river sand or molding sand will have a lower fusion point than either of the materials alone. Eutectics are formed in accordance with the principles of thermochemical mineralogy.

When such materials are used, the daubing melts down before the cupola reaches its full heat, the patching brick are carried along with it, the brick lining has no protection, and thick, gummy slags are formed. A serious "bridge" may occur, the slag hole frequently becomes frozen, the melting goes off schedule and the iron may be of inferior quality. The right kind of daubing mud is highly important in conserving refractories.

### Mud Should Be Refractory

There are nearly as many daubing mixtures as there are gray iron foundries, but the following are recommended, as they give good service and help to preserve the lining:

#### FORMULA NO. 1

Two parts white silica sand (waste sand reclaimed from sand blast machines is excellent for this purpose provided it does not contain too much iron scale).

One part plastic fire clay (fusion point at least Cone 26 (2903 degrees Fahr.)).

#### FORMULA NO. 2

Six parts crushed fire brick—through 10 mesh riddle. (Old fire brick reclaimed from the cupola lining can be crushed by placing in a tumbling barrel containing a few pigs of iron.)

Four parts plastic fire clay (fusion point at least Cone 26 (2903 degrees Fahr.)).

Either of the above compositions should be mixed dry, then thoroughly blended with enough water to make a stiff plastic mud, preferably in a muller mixer of the Simpson or Clearfield type.

Never use river sand, molding sand, yellow loam, or blue shale daubing muds.

We will not attempt to discuss the controversial subject of tuyeres, but it would be impossible to overemphasize the importance of proper air supply. It is essential to see that the right amount of air gets into the cupola with the proper penetration. The blast pressure should be kept uniform and a good pressure gauge will soon pay for itself in increased efficiency. A pressure gauge alone is not sufficient, and it is highly desirable to use a volume gauge or one of the newer air controls to weigh the quantity of air going into the cupola. Excessive blast will oxidize the iron and this will cause severe cutting of the blocks in the melting zone.

Life of the melting zone lining normally is proportional to the melting zone temperature and the duration of the heat. It is useless and uneconomical to


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melt at a higher temperature than is actually required for the type of castings being made. The eyes of most foundrymen, as well as brickmakers, are unreliable and a good optical pyrometer is much better for measuring the temperature of the iron as tapped.

Nature of the mixture used in the cupola and the method of charging, has considerable bearing on life of the lining. A high percentage of steel scrap with its higher melting temperature decreases the life of the brick in the melting zone. Scrap should be in small pieces so that it will not divert the blast against the lining. Careful charging will prolong the life of the lining in the abrasion zone.

Proper slagging of the cupola is necessary in order to conserve refractory lining. Very little consideration has been given to the fluxing materials used and little is known regarding their behavior in a cupola. For example, fluorspar is a glassy mineral consisting of 51.1 per cent calcium and 48.9 per cent fluorine. It decrepitates or flies to pieces when heated and melts at 2462 degrees Fahr., forming an enamel-like substance consisting principally of lime. It is very useful for thinning slags but is extremely corrosive to the cupola lining if carelessly used.

### Aragonite Disintegrates

Calcite, the primary mineral constituent of limestone consists of 56 per cent lime and 44 per cent carbon dioxide. Those stones containing an appreciable amount of magnesia (15 to 20 per cent) are considered as dolomite. Aragonite has the same chemical composition as calcite, but it flies to pieces when heated, most of it may be blown out the stack and it is useless as a fluxing stone.

When calcite and dolomite are heated in the cupola they dissociate into carbon dioxide and lime or lime-magnesia mixtures. Dolomite is probably the more effective flux, although limestone is widely used. Whatever stone is used, it should be of high purity and of egg size. In charging, it should be kept about 6 inches away from the cupola lining since lime and magnesia are corrosive to fire brick.

Cupola slag in itself is not particularly destructive to the lining unless it contains large amounts of metallic oxides, but the basic materials forming the slag (iron oxide, lime and magnesia) are corrosive. Slag should never be permitted to become stiff and gummy, but should be kept fluid and removed from the cupola as promptly as possible. The slag hole should not be permitted to become so large that the blast blows through it. A blast of slag will destroy slag hole blocks.

It is difficult to make a fire clay slag hole block that will give the desired service in large production foundries. Some foundries, however, install two slag blocks side by side. They use one during the first half of a long heat, then mud it off and complete the slagging operation with the other block. Silicon carbide blocks apparently give good service in large foundries but they are expensive. Worn out snagging wheels, if they are silicate bonded, can be used for slag holes by knocking out the arbor bushing. However, rubber bonded and bakelite bonded wheels obviously are not suitable for this job.

Cupola slags are extremely variable in composition, color and physical properties. The easiest slag on the fire brick lining is the one of a grayish green color and hard compact structure. Bluish, foamy slags will indicate that considerable damage has been done to the lining. Careful examination of the slag each day will provide much information on the operation of the cupola.

Many foundries now use fused soda ash as a supplemental flux in cupolas. We feel that this is good practice from the refractory standpoint, even though we know soda ash would be corrosive to fire brick if carelessly used. When properly used, soda ash improves combustion, is very effective in forming a fluid slag which can be removed quickly from the cupola, and since it reduces oxidation, especially where large quantities of steel scrap are used, it actually helps to conserve the life of the lining.

Cupola lining can be preserved much longer than usual if the last charge is not coked and the blast is shut off as soon as a white heat is reached. More


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If you operate a steel or grey iron foundry and seek more speed with greater tonnage output in your cleaning room, by all means try Dayton Snagging Wheels.

Foundries by the hundreds have found they really do the work in less time . . . they stand up . . . and their men like to use them.

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fire brick are "burned" in the cupola at this time than at any other period because the blast works directly on the lining. The blast is not needed after the stock turns white as the bed will melt any small amount of iron that may be left.

For cupola spouts we recommend the use of manufactured trough tile. They are easy to install, their use saves considerable labor, they prevent run-outs, they last much longer than ordinary fire brick or sand-clay mixtures and they give much cleaner iron.

Ladle refractories are just as important in the efficient operation of a foundry as any other refractory materials, and proper consideration should be given to them. In desulphurizing ladles regular fire brick fail rapidly due to the corrosive action of soda ash and soda slags on the joints in the lining. We have found that rammed-in, plastic refractory linings give the best and most economical service, provided the plastic is made from calcined fire clay instead of ground-up brick bats. Brick linings would be satisfactory if a suitable jointing material could be found. Experiments are being conducted on some materials at this time which appear to be promising.

Many foundries use brick linings in large ladles handling cupola iron. When these brick are laid in suitable refractory bonding mortar, the life of the brick is lengthened considerably.

Siliceous ramming refractories are coming into wide use for lining ladles handling cupola iron, malleable iron and electric furnace steel. This type of refractory is especially valuable in lining covered pouring ladles. The material is highly refractory, has low permeability, has high bond strength and is easily rammed into a solid, monolithic structure.

Circular fire clay disks, called ladle bottom tile, will prevent bottom runouts. They also give a dry bottom, are easy to install and offer a substantial saving in labor cost. They last much longer than 9-inch straights and 1¼-inch splits.

**Selected References**


"Cupola Practice For Production And Jobbing Foundries"—Wm. H. Brooks.

"Suggestions on Cupola Operation"—The Ironton Fire Brick Co.

"Refractories for Use in Cupolas"—C. E. Bales—Technical Bulletin 43, American Refractories Institute.

"Report on Recommendations for Cupola Operation"—A.F.A. Gray Iron committee.

"Cupola Design and Operation — Melting Practice"—Geo. S. Evans.

"Effect of Cupola Practice on Linings"—C. K. Donoho and C. F. Greene.

"Overcoming Spout Trouble by Use of a Monolithic Trough Tile"—J. A. Bowers and C. F. Greene.

"Refractories For Foundry Ladles"—C. E. Bales and A. R. Blackburn.

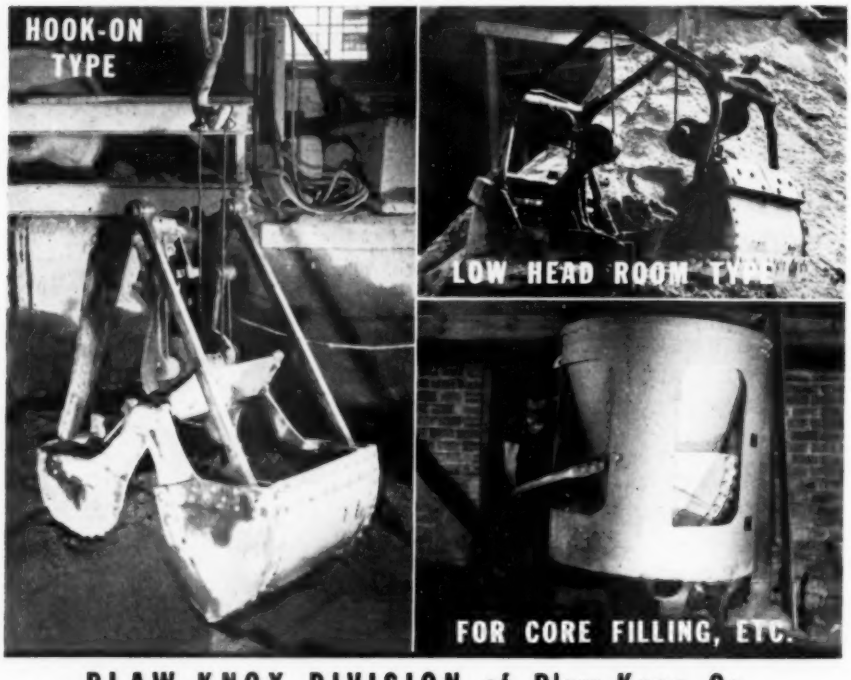


# Blaw-Knox "hook-on" BUCKETS *take the least of your crane time...*

Blaw-Knox Foundry Type Single Line Buckets are made *convenient* for you—they can be hooked on or off the crane block as required. They operate easily and they last long.

Blaw-Knox has a wide variety of foundry clamshell buckets to choose from—considering the available operating clearance, crane load capacities, working space limitations, character and state of material to be handled, safety features.

See Blaw-Knox Buckets in Catalog No. 1696—yours for the asking.

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## Electric Metal Group To Meet at Chicago

Sectional meeting of the Electric Metal Makers Guild, to be held at Hotel Morrison, Chicago, May 1, includes special sessions for melting foremen, melters and first and second helpers on electric furnaces. These men, although not members, are being admitted to the meetings as a training aid because of the rapid growth of electric furnace capacity.

Two separate conferences, one on ingots and one on castings, are scheduled during the day with a joint session in the evening.

Roundtable discussions will follow the special group meetings. Leading the quiz section on castings will be Fred J. Blaney, Ohio Steel Foundries, Springfield, O.; Alfred Gierach, American Manganese Steel Co., Chicago Heights, Ill.; Martin McDonough, National Malleable & Steel Castings Co.; George Messenger, Kensington Steel Co., Chicago; James C. Sweitzer, Sivyer Steel Casting Co., Milwaukee; and Ray Wilcox, Detroit Steel Casting Co., Detroit.

The panel on ingot discussion will include J. E. Arthur, Crucible Steel Co. of America, Pittsburgh; W. M. Farnsworth, Republic Steel Corp., Canton, O.; L. S. Fry, Joslyn Mfg. Co., Fort Wayne; Harold Phelps, Rotary Electric Steel Co., Detroit; Joseph Scott, Driver-Harris Co., Harrison, N. J., and Harry Walther, Timken Steel & Tube Division, Canton.

# CORES FOR MAGNESIUM CASTINGS

(*Continued from page 97*)

clean from core boxes and driers, and should not offer objectionable fumes.

Many magnesium foundries have found it necessary to provide large storage rooms where cores are kept at a temperature of 100 degrees Fahr. to prevent moisture from being absorbed by the cores. We have not found this practice necessary if the core is baked thoroughly and the binders and sprays which are used do not show the tendency for absorbing moisture.

Cereal binders and clays are useful in magnesium core sands for green strength to support chills and to some extent for dry strength. Western bentonite clay, although usually cheaper than cereal binders, if used alone may cause "gumminess", and due to the large surface area of its grain, absorbs considerable more oil for the same dry core strength. However, bentonite, as a rule, has a greater dry strength than cereal binders, reducing the tendency for sagging during baking, before the oil is completely baked.

Cereal binders do not absorb oil excessively. Cores made with cereal binders may tend to absorb moisture from the air as mentioned by Brooks and Winston in an article, "Producing Magnesium Castings" in the March, 1941 issue of THE FOUNDRY. However, when used in small amounts certain cereal binders, if thoroughly baked, do not give excessive trouble in this respect and assist the green compression considerably without appreciably affecting dry strength. Cereal binders, as indicated in *Modern Core Practices and Theories*, by H. W. Dietert, are particularly effective in sharp sand, are quick drying, and reduce the amount of oil required, thereby helping collapsibility.

For sands which must be rammed into thin sections of a core box, or which require a greater flowability with a minimum of "gumminess", southern bentonite may be used instead of the western type as shown in Table III as No. 5 for pipe sand.

Dextrin, because of its property of migrating to the surface while baking, is sometimes added to the sand to help form a hard crust. However, in using dextrin extra caution is required to keep the core dry since this material has a great affinity for water vapor and draws moisture rapidly.

The problem of combining all the necessary properties in one core sand is a difficult one. For example, easy collapse should be of major importance in cores surrounded by metal. However, the rigid dimensional requirements of aircraft engine castings necessitate cores which will not sag during baking. Therefore, the hot strength should be greater for thin pipe core sands and print-core sands than for sands used in jacket cores. The logical course to follow, then, is to prepare several sand mixtures for the various uses and to incorporate in each mixture as many as possible of the requirements most important for each specific application.

We have found for our purposes that seven mixtures give a sufficient range of properties from which a sand may be selected for practically any type of core. In some cores two or even three mixtures may be used in various portions of the same core. Table III shows the ingredients and proportions in each mixture and the range of physical properties for each mixture.

In general, the applications of these mixtures may be listed as follows:

No. 1. Regular Sand — For outside cores and general use. Makes up the largest proportion of cores made. Medium hot strength, high green compression to support chills.

No. 2. Weak Sand—For cores partially surrounded by metal but requiring some strength for support. For large, heavy, internal cores. Low hot strength, low tensile strength, high green compression to support chills.

No. 3. Blowing Mach. (Sharp Sand) —For use exclusively in blowing machines. Requires green and dry strength since a minimum of supporting wires can be used. Since fewer chills are used in blown cores and driers are used extensively, green strength may be de-


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QUALITIES

1 *Mogul* – the perfect green and facing bond.

2 *Mogul* replaces some clay and develops high permeability.

3 *Mogul* works perfectly with

*Core Oil* – because it decreases drying time and produces smooth, clean cores.

Pitch or Resin – because cores can be handled while still warm.

4 *Mogul* – because sharp sand can be widely used.

5 *Mogul* – because smoke and gas are greatly reduced.

6 *Mogul* saves binder costs – drying time – cleaning costs.

7

*MOGUL CAN BE USED IN CORES WHERE BOTH GREEN AND DRY STRENGTH ARE REQUIRED . . . .*

*Remember – By using Mogul you will increase the core maker's production, the core oven production, the foundry good casting yield and gain low casting cleaning costs.*

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creased. This also reduces sticking during blowing.

No. 4. Slab Core Sand (Silica)—For some blowing machine work, or more often for slab cores and other bench work requiring more green and dry strength than No. 1 sand.

No. 5. Pipe Sand—For cores used in long thin pipes, oil lines and pressure chambers with a small cross-section. Medium dry strength and high hot strength to prevent sagging.

No. 6. Print Sand—For core prints, ram-up cores and locator-cores. High dry and hot strength. These cores can be as hard as necessary since they seldom come in contact with the casting surface, if such is the case, as may occur with ram-up cores, these rarely form undercuts in the casting. Consequently there is little danger of these cores preventing free shrinkage of the casting.

No. 7. Special Weak—For internal cores in oil sumps, jackets, etc. where the core is almost completely surrounded by metal, and where shape of core offers enough resistance to sagging to permit very low dry strength and hot strength. Very high green strength so sand will hold its shape without oil. Cores made with special weak sand are all sprayed with a drying oil before baking, and with the fluoride protective spray after baking, since to help collapsibility sulphur and boric acid are not used in this mixture.

Temperature and time required for baking magnesium cores depends, of course, on the character of the binder used and the size of the core. In general, however, it may be said that the cores should be baked thoroughly to reduce gas. Care should be taken to avoid excessive burning out of sulphur, at the surface of the core, since sulphur has an auto-ignition point of 450 degrees Fahr. Consequently, it is better to bake magnesium cores below this temperature.

Too often, only time and temperature are taken into consideration in the baking of a core. Atmospheric humidity and the moisture formed during the combustion of the core oven heating fuel also play an important part in the uniformity of core properties, as pointed out by A. S. Coulter, in an article "Humidity and Oil Sand Cores" in the February, 1933 issue of THE FOUNDRY, and in rapidity of baking. Special consideration should be given to venting the oven to remove gases and supply fresh air to help oxidize the core oil. At the Ford Magnesium Foundry, large cores for magnesium engine castings can be baked thoroughly in 3 hours and 40 minutes, as compared with 7 to 8 hours for the same type of core in other foundries. Careful attention to ventilation and forced circulation of hot gases in the design of the core ovens has made this shorter baking time possible.

### Cores Rammed By Hand

The large number of chills which must be placed by hand into the core boxes greatly hinders the application of labor-saving equipment such as jolt machines or sand slingers, in the ramming of cores for magnesium work. At the Ford Magnesium Foundry small cores are hand rammed on benches and large cores are hand-rammed on roll-over type machines.

Fig. 4 shows a portion of the Ford Magnesium Foundry core room. Some of the benches for small core work may be seen. Any one of seven core mixtures may be conveyed from the mixers into the hoppers over the core benches by a system of belts and plows.

Blowing machines find wide application but are limited due to the difficulty of placing chills in blown cores. This difficulty has been overcome to some extent by placing pins in the blow-boxes to hold chills, or by placing in the blow-box chill prints which form cavities in the green core. The chills may then be pasted into the print cavities after the core is stripped from the box. Blowing machines are efficient for rapid production where a large number of small or even medium-sized cores are required. However, before setting up a job for production in a blowing machine, all cost factors, such as the added number of core boxes and upkeep, should be taken into consideration.

Since they eliminate the human element, blowing machines give greater uniformity in ramming. In a blown core

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THE SIMPLICITY TAKES 7 MINUTES

Simplicity units are chalking up records for amazing savings all over the country. A large Ohio foundry producing an 18-ton casting had required 80 man hours for cleaning. After installing an 8'x 10' dual Simplicity Shakeout they now clean the same casting in 7 minutes.

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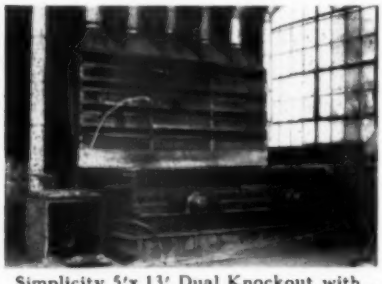

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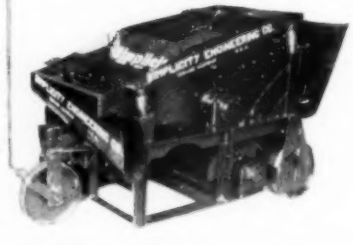

Simplicity

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the finer sand grains tend to arrange themselves at the outer surface of the core, giving higher permeability, better surface, and easier collapse. Sand mixtures for use in blowing machines must have maximum flowability to permit ramming into restricted corners of the box, and blow-boxes should be designed with proper vents and screens in sufficient number to fill all corners and avoid excessive wear.

Fig. 3 shows another portion of the Ford Magnesium Foundry core room. A blowing machine and vertical core ovens can be seen in the background.

Good general foundry practice is applied in finishing magnesium cores. Fins at joints or loose pieces are trimmed off and fillets placed around edges which might crumble. Joints and areas around chills are smoothed out with a suitable inert and refractory mudding compound. This compound is applied, as in general core practice, usually with the fingers; and for magnesium is usually a fine powder such as talc, "Windsor-Lock" Sand, fine silica sand, etc., made into a soft mud with water, and sometimes bentonite or cereal binder. One-half to 1 per cent each of sulphur and boric acid should be added as protective agents. After the mud is applied, special care should be taken to dry it thoroughly before the core is used.

Complicated vent passages are inspected carefully to see that they are joined, especially in thin pipe cores, to allow for rapid escape of gases.

### Wash Seldom Used

Core washes are not used very often in magnesium core practice, as they tend to reduce the permeability of the core. There is usually no necessity for a wash since magnesium does not tend to penetrate between the grains or to cause the sand to fuse and stick to the casting. However, washes are often used where an exceptionally smooth surface is required, or in a special case where it is desired to *decrease* the surface permeability of an internal core so that any gas generated within the core will not form a blow in the casting surface but will pass off through vents into the core print. This coating is usually graphite or plumbago, with proper protective agents added, suspended in water or other solvent.

Grinding fixtures find wide application in many cases to insure uniformity of core dimensions, especially to maintain even metal thickness in pressure-tight, thin-walled engine castings. Templates, gages and assembly fixtures are very important for accuracy, especially in pasted cores.

Considerable technical and practical data has been collected in the past about the properties of cores, the effect of each ingredient and the behavior of the core during baking and casting operations. The application of these data, bearing in mind the peculiar characteristics of magnesium, has done much to make a beginning in the difficult task of close and consistent control of magnesium core properties. At present very good results are being obtained. However, there are still many variables about which we have much to learn before we can hope for positive and definite control of these properties. With the co-operation of supplier, equipment engineer, technician and practical foundryman, we may hope that these variables can some day be harnessed to help make consistently better sand cores, better magnesium castings, and happier foundrymen.

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American Colloid Co., Chicago, has published a 14-page bulletin entitled "Heat Penetration Into Foundry Molds" which discusses the progressive changes in foundry molds due to heating and subsequent cooling.

## Metal Trades Group To Meet in May

Annual convention and production conference of the National Metal Trades Association will be held at the Palmer House, Chicago, May 26 and 27. Theme of the meeting will be "Production Keys to Victory." Sessions will be devoted to discussion of production problems, industrial relations, training programs for personnel, new developments and techniques, and government legislation. President of the National Metal Trades Association is R. S. Clark, vice president and treasurer, Package Machinery Co., Springfield, Mass.


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## SPECIALIZES IN NONFERROUS CASTINGS

(*Continued from page 100*)

room in this department is fitted in a special manner with benches, vises and small tools, where a crew of girls put the finishing touches on a constant volume of small miscellaneous castings. It is claimed the girls in a very short time develop a high degree of manual dexterity in the inspection of these castings and in correcting minor variations with hammer and file. They are dressed in attractive maroon-colored uniforms supplied by the company in three standard sizes with adjustable drawstrings here and there—not to be too specific—to fit those wearers whose figures vary to some slight degree from the standard.

Close and constant check is kept on the sand from which molds and cores are made. The molding sand is made up of two base sands with screen analysis as shown in the accompanying Table II. One is somewhat coarser than the other. By varying the proportions in the mixture, a suitable grade is made available for light, medium and heavy castings. The sand is prepared in a muller-type mixer and then passed through an aerating device before it is taken by truck to the various floors. Core sand is bonded with oil, while the molding sand is bonded with bentonite and cereal binder, the amount depending on whether the sand is to be used in green sand, skin dried or dry sand molds.

Green sand in which magnesium castings are made requires extra care and attention. An inhibitor must be mixed with the sand to prevent undesirable reaction between the metal and the moisture in the sand. The moisture content is held to about 2 per cent, a point considerably below that of sand employed in making green sand molds for castings of any other metal used in foundry practice. Inhibitor materials include sulphur, boric acid, ammonium bifluoride, diethylene glycol and others, in amounts ranging from 4 to 10 per cent by weight. Green sand has a permeability ranging between 40 and 100 depending on size, shape and weight of the casting, shear strength 4 to 9 pounds and moderate dry tensile strength. In certain instances the green sand mold is merely a shell or casing in which a number of dry sand cores are assembled to form the mold cavity.

An inhibiting agent also is used in the dry sand cores for magnesium castings. Where sulphur is used the baking temperature necessarily must be lower than the melting point of sulphur, 120 degrees Cent. or 248 degrees Fahr. Cores in which cereal binder is used to give green strength must be kept warm until used since that causes the core to pick up moisture. Certain binders are not suitable since they prevent free contraction of the metal in the casting and also produce cores that are more or less difficult to remove from the casting during the cleaning process. Experimental work has been carried on with synthetic resins and other possible binding materials.

Magnesium metal is melted in a crucible-type pit furnace in which the metal is protected from oxidation by the use of a proprietary flux which first becomes fluid and then becomes dry and crusty after brief exposure to high temperature. As the metal is charged and during the melting process, flux is dusted on the surface in quantities needed to prevent burning. The amount is small. The metal is heated to a temperature of ap-

**Table II**

Sieve Analysis

| No. 1 Per cent | Screen | No. 2 Per cent |
|---|---|---|
| 4.08 | 70 | 4.60 |
| 18.36 | 100 | 17.40 |
| 22.96 | 140 | 29.40 |
| 19.10 | 200 | 35.10 |
| 13.10 | 270 | 11.40 |
| 22.30 | | 1.68 |
| 99.90 | | 0.26 |
| | | 99.84 |


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proximately 1600 degrees Fahr. and then allowed to cool to the proper casting temperature which may vary between 1400 and 1550 degrees Fahr. depending on the shape, size and weight of the casting. It is claimed the superheating operation refines the grain and thereby improves the mechanical properties of all magnesium alloys.

After the crucible is lifted from the furnace the surface of the metal is cleaned by removal of the scale and oxide from the surface and the pouring lip. The metal burns readily at a temperature between 1400 and 1500 degrees Fahr. when the protecting flux layer is removed. During the cleaning and pouring period the burning is controlled by dusting a 50-50 mixture of finely powdered sulphur and boric acid on the surface.

### Castings Heat Treated

Magnesium castings are heat treated in two circular oil-fired furnaces in the cleaning room. The castings are brought up to the solution heat treating temperature in not less than 2 hours, left for a specified total time, removed and cooled in air. Temperature and total time for the two common magnesium sand casting alloys are: Dowmetal H, A.S.T.M. alloy No. 4, 12 hours at 730 degrees Fahr., and Dowmetal C, A.S.T.M. alloy No. 17, 20 hours at 760 degrees Fahr. The solution heat treatment increases tensile strength and elongation and is particularly desirable for parts requiring shock resistance—for example, airplane landing wheels. Increased hardness and high yield strength even at a sacrifice of elongation are secured through an aging treatment of 16 hours at a temperature of 350 degrees Fahr. following the solution treatment.

Final cleaning and grinding of the castings is conducted on a perforated bench through which a current of air draws the metallic dust and collects it in water. This is a protection against fire, an ever present hazard with dust from this metal inflammable at comparatively low temperatures.

Over a period of several years a method has been developed for pouring many castings directly through the riser. The following excerpt covering certain details is taken from a paper presented by Charles Brisbois, foundry manager, and A. E. Cartwright, metallurgist, Robert Mitchell Co. Inc., at the Cleveland convention of the American Foundrymen's Association, May 14, 1938.

Properly applied, the principle of direct riser pouring provides the following advantages: (a) Enhanced effectiveness of feeding by having the feeding head filled last with hottest metal, and maintenance of feeding head temperature by having the head covered with a heated strainer core. (b) Moderate economy in feeding metal and gates, with large economy brought about by reduction in the number of defective castings. (c) Much lessened sensitivity to feeding head proportions for different casting designs and alloys of different shrinkage characteristics. The feeding head generally is of a size to compensate for a range of shrinkage wider than that provided for by the more usual methods. (d) Generally lower requisite pouring temperatures for all alloys with corresponding less necessity for excessive superheating, an especially attractive feature from the metallurgical standpoint where alloys most susceptible to oxidation or gas absorption are concerned.

Basic design of the feeding head is a straight side, round shoulder, short neck bottle. Total height and diameter are variable, according to the size of section and the alloy to be fed. Modifications of design are necessary to suit casting design, shape and position of cores, etc., but so far as possible the following principles of proportion are adhered to: The diameter of the base or neck of the feeding head adjoining the casting should be not less than one half the full diameter of the head. The full diameter of the head should be continued downward to a point as near the casting as is consistent with maintaining a sufficient mold strength at the junction.

The riser pattern decided upon is handed to the molder along with the pattern for the casting. This eliminates uncertainties due to any misunderstanding on the molder's part. Some riser patterns are wood. Others are hollow aluminum. Plain cylindrical or square extensions are available for varying


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THE FIRST conveyor in a tunnel under a storage pile
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THE FIRST rotary stone grizzly
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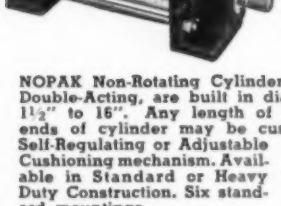

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heights. A core print is provided for seating the strainer core.

Most of the experiments were carried on with dry sand molds because the more expensive rejections came from this type of work, fairly large castings with relatively heavy sections. Suitable sand corresponding to A.F.A. coarse No. 3 or fine No. 4 is coated with a graphite wash to secure a good surface on the casting. High permeability sand is preferred to sand that requires the use of a vent wire. The synthetic sand mixture for direct riser pouring consists of a pure white silica sand bonded with 10 to 12 per cent bentonite. The heap sand has been built up over a period of years by preparation of a facing sand including about 20 per cent new silica sand. Where no increase is required in the heap, the facing usually is prepared from 100 per cent heap sand and 1 per cent bentonite. Addition of 2 to 5 per cent cereal binder is made to the facing sand to combat the tendency toward surface drying and crumbling.

Strainer cores are made of a strong oil sand mixture and in standard diameters from 2 to 10 inches and in thickness from ½ to 1½ inches. Number and size of the holes vary according to the job, generally from 4 to 12 holes ¼ to ½ inch in diameter. Except where it is required to avoid striking a central core, the gate holes are arranged near the center of the strainer core. In all cases care is exercised to prevent metal striking directly on any protruding sand section of mold or core.

The method is amenable to many modifications. For example bushings of large size usually are poured through four feeding heads spaced 90 degrees apart. The risers are fed from a circular pouring basin over the top and the metal enters the risers simultaneously through the four strainer cores. For additional certainty or with high shrinkage alloys, the bushing is extended and the diameter is increased in addition to the risers.

The method is not applicable to all sizes and types of castings. In general any casting that requires a substantial riser may be considered eligible. Exceptions from the point of view of suitable alloys include the yellow brasses, manganese and aluminum bronze and the light aluminum alloys.

## Lists Sizes of Rope Substitutions

A chart indicating the proper substitution of weldless chains for small-diameter manila ropes has been compiled from a study made by the Chain Institute Inc., 208 South LaSalle street, Chicago. Scarcity of manila rope and tight supply of welded chain prompted the study to determine what size weldless chain could be substituted for the former to provide comparable strength. Comparisons are given for rope sizes ranging from 3/16 to ¾-inch diameters. Copies of the chart are available from chain manufacturers and hardware wholesalers.


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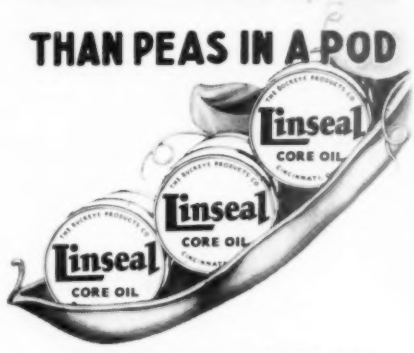


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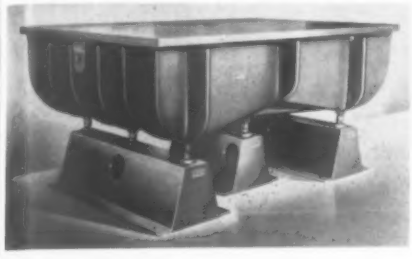

the acompanying illustration measures 4x6 feet, with a depth of 20 inches and weight in excess of 2 tons. It is made of Meehanite iron.

Designed and manufactured by Machine Products Corp., Detroit, for a maker of aircraft motors, it is intended to provide a smooth, level surface at all points. The plate is mounted on specially designed pedestal type bases provided with three adjustable bearings and supplemented by additional adjustable screws for leveling purposes.

## Book Review

*Principles of Physical Metallurgy*, by Gilbert E. Doan and Elbert M. Mahla, 388 pages, 6 by 9 inches, published by McGraw-Hill Book Co., New York, price $3.50.

Since 1935 when the first edition of this book was published, more adequate explanations of metallic behavior have become available. These have been incorporated in this second edition. Recrystallization, creep and fatigue, austenite transformation, age hardening, welding and powder metallurgy are among the more practical aspects whose treatments in the book have benefited from the recent advances.

The book is divided into three main divisions covering the physics of metals, metallography, and metal technology, and each of those is subdivided into 12 chapters which run consecutively. The first discusses states of aggregation, the second properties of metals and their change with temperature, and the third with mechanical properties of metals and their change with temperature. The fourth, fifth and sixth chapters describe constitution of binary alloys, phase rule; crystal structure of binary alloys; nonequilibrium structures in binary alloys, quenching, aging. Structures of ternary alloys and the properties of alloys are the subjects of the seventh and eighth chapters. Ninth chapter relates to shaping of metals while the tenth describes heat treatment and surface treatment of metals. Testing of metals and some commercial alloys, process and problems are discussed in the eleventh and twelfth chapters.


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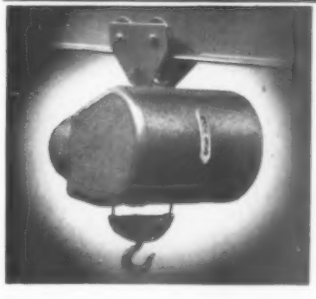

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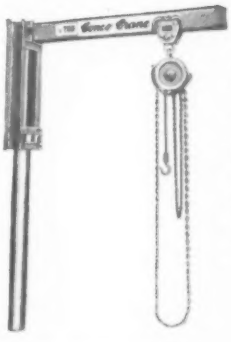

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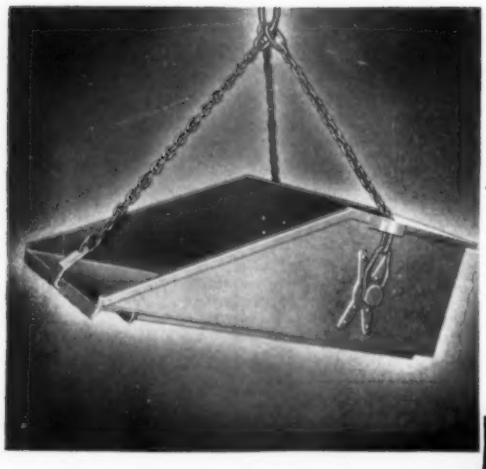

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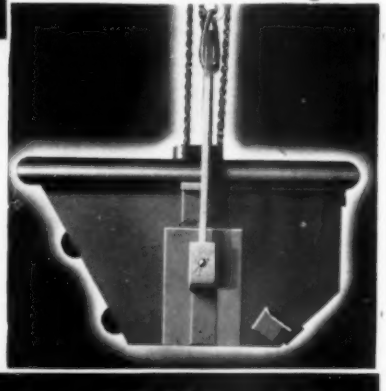

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# FOUNDRY CONCENTRATION UNSUCCESSFUL

(*Continued from page* 101)

labor; release of storage space; economy of fuel.

In applying the scheme to the iron foundries, the Board of Trade was advised by the Iron and Steel Control of the Ministry of Supply and by the Ministry of Labour and National Service. The government supply departments were also consulted. The authorities expected that a substantial amount of labor would be released through concentration, and Iron and Steel Control was anxious to obtain extra labor for certain steel industries engaged in essential war production and suffering from labor shortage.

First steps were taken in October, 1941. The Advisory Committee to Iron and Steel Control was called into consultation by the Board of Trade. The Advisory Committee was a panel of representatives of the industry itself, set up to give independent advice to Control on matters relative to iron founding. When this committee was informed of the intention of applying concentration to the industry, it advised against it. It pointed out that concentration would not release the amount of labor expected and that considerable disturbance would be caused to war production if the scheme were pursued.

### Plan Adopted Year Ago

Eventually, in April, 1942, a plan which had been prepared by Iron and Steel Control and the Ministry of Labour was adopted by the Board of Trade for the London and South Eastern Region. Almost 50 per cent of the foundries were designated as closed, representing about 28 per cent of the tonnage produced by all the foundries of the region. Essential production of the closed plants was to be taken over by the nucleus firms, and a certain proportion of released labor would be transferred to the nucleus companies. A few men were kept in each closed foundry for maintenance and fire watching.

The Board of Trade invited the London & District Ironfounders Association to arrange for the application of the scheme, and the association agreed to cooperate and form a committee to study the program and make recommendations. As a result of these negotiations a final plan was approved and it was agreed that 25 per cent of the total number of foundries would be closed, as against 50 per cent in the original proposal. Foundries had been grouped into areas and, in the majority of cases, arrangements for the transfer of production and compensation to closed firms were made within each group. At the time of writing (March, 1943), owing to various difficulties, the plan was not yet in full application, and only a small percentage

of the original number of workers expected to be released for outside industries were actually made available.

When the London scheme was issued, the Council of Ironfoundry Associations had not been consulted. This council was constituted in October, 1941, to safeguard the interests of the Industry as a whole and negotiate matters of national importance with government departments. The council took up the matter with the authorities and it was decided that it would be consulted in regard to future programs.

The next region to be dealt with was the Midlands. This region comprised over two and a half times as many gray iron foundries as the London region, and the original concentration provided for 42 per cent of the foundries to be closed, representing 12.3 per cent of the total tonnage and 14.2 per cent of the labor force. Council of Ironfoundry Associations had set up a Central Concentration Committee to deal with the general aspects of concentration, and a local concentration committee for the Midland region was formed to deal in detail with the scheme in that region. The region had been divided into area groups and each group elected a chairman and a corresponding member who investigated the situation under the guidance of the Local Committee. Questionnaires to collect necessary information were sent to each of the foundries involved.

### Fewer Plants Closed

After a complete survey a revised plan was submitted to Iron and Steel Control. In this revision, only 11.2 per cent of the foundries were proposed to be closed; an additional 5.6 per cent were recommended to be kept in operation for three months, subject to investigation. The revised program accepted by Iron and Steel Control and the Board of Trade, released only one-fifth as many workers as proposed originally, and practically all of them were required for transfer to nucleus firms or for maintenance and fire watching in the closed foundries.

Outcome of concentration in the Midland region was of considerable interest because it brought out the difficulties that had been foreseen by representatives of the industry in their original discussions with the Board of Trade and it justified the assumption then made that the number of men released for outside industry would be very small.

Principal difficulties encountered in the practical application of concentration to gray iron foundries were:

A number of foundries qualified for nucleus status were already fully engaged on essential war production. They could not take over the production of closed firms without additional labor. Furthermore, in many cases, such foundries were not normally equipped for making the type of castings made by the closed firms, so that if they did take over such production their own output would be affected adversely.

Many small foundries selected to be closed in the original scheme were in


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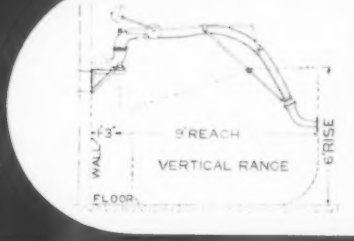


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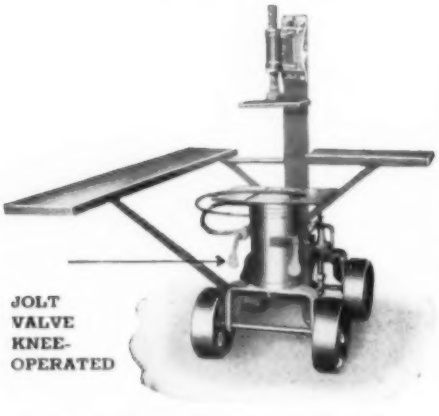


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close proximity to important iron and steel works, engineering firms, collieries, etc., which were dependent upon these foundries for prompt repair work; the closure of such foundries could easily have jeopardized the manufacturing programs of concerns engaged on work of the highest priority; such repair jobs could not be dovetailed into the regular production of most nucleus foundries.

In many cases foundries were part of an engineering concern for which the castings had to be processed further at their own works. Closing such foundries would cause endless complications and loss of time since castings would have to be made somewhere else and transported back to the original works for processing.

Transfer of work from one foundry to another involved an additional load on transport. In some cases, thousands of patterns would have to be transferred from one foundry to another. There were also complications in regard to transfer of labor, differences of wages, rates, etc.

All these difficulties caused the original scheme for the Midlands region to be cut down to the final one that was finally agreed upon.

### Other Regions Affected

Following the Midlands concentration, the Council of Ironfoundry Associations was invited to participate, with Iron and Steel Control and the Ministry of Labour and National Service, in preparing plans for other regions. The same machinery was adopted as had been used in the Midlands. Questionnaires were sent to the foundries, local concentration committees were formed, and regions were divided into area groups, each with a chairman and a corresponding member.

Results of the investigation made in two regions showed, like in the Midlands, that concentration would release only a negligible number of workers for outside industries. In one region less than a quarter of the number of men anticipated were released from closed foundries and they would be required for the nucleus firms; a little less than half the original number of foundries originally designated as closed were actually recommended for closure. In another district, again only half the original number of foundries were closed, and 57 per cent of the original number of men to be released could be made available—mainly for the nucleus firms.

Investigations carried out in four regions enabled the council to arrive at the conclusion that concentration thus applied to the whole industry would yield negligible results from the point of view of the release of labor, and at the price of considerable disturbance to the industry with unfavorable reactions on war production. It was considered that any inefficient foundry, or foundries still engaged mainly on non-essential work, could be closed by other, more simple means. With regard to certain types of castings, of which only a


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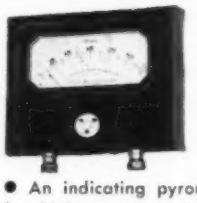

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limited tonnage was necessary, the council also thought that the government departments could establish a program of their requirements, and that M forms (the forms giving the necessary authority to contractors to order raw materials) should only be issued by Iron and Steel Control to those foundries best equipped to manufacture the castings required. A deputation from the council interviewed the president of the Board of Trade at the end of January, and after consultation with Iron and Steel Control and the Ministry of Labour and National Service, it was decided not to proceed with the scheme.

Concurrently with investigations that were being carried out in various regions, the C.F.A. main concentration committee was investigating a plan for compensating the foundries that were to be closed. As and when each regional concentration program was agreed upon, compensation arrangements to cover irreducible expenses of the closed firms and a reasonable proportion of loss of profit were made within each group, but the industry in general wanted a national compensation procedure so that the burden be equally spread over the whole industry.

### Compensation Arranged

This national compensation scheme was to cover irreducible expenses only, and loss of profit would still have to be taken care of by group arrangements. The national scheme was to provide for a central fund, obtained by a levy to be charged on the nucleus firms. From this fund payments were to be made to the closed firms, each one receiving a sum based on its production during a certain period.

Various ways were considered in order to assess the levy on the nucleus firms: turnover, tonnage of raw material consumed, output, wages. Each one presented serious difficulties and finally at the stage reached when concentration was withdrawn, a compensation plan was to be proposed, in which the levy was to be based equally on wages and production. This was the nearest approach to meeting the requirements of equitable spread and simplicity.

Negotiations between the Board of Trade and Iron and Steel Control, and the Council of Ironfoundry Associations, were most cordial throughout, and the withdrawal of the program shows considerable understanding and statesmanship on the part of the authorities when it was found, with the collaboration of the C.F.A., that concentration could not be applied to the iron foundry industry in the same way as to other less essential and less complex industries.

---

Aluminum Co. of America, Gulf building, Pittsburgh, has published a 100-page booklet entitled, "Welding and Brazing Alcoa Aluminum". It is divided into two parts, one on welding and the other on brazing. It describes gas and arc welding, inspection and specifications for welding, resistance welding, and different brazing procedures.


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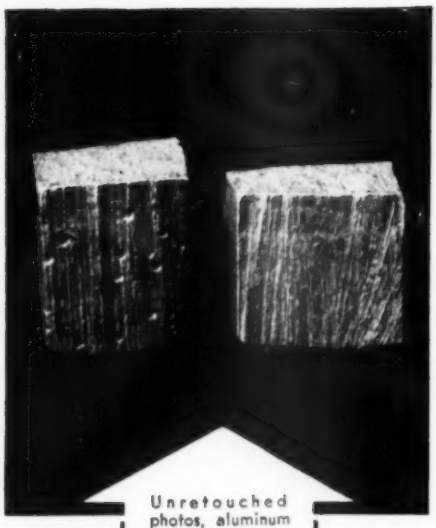

Unretouched photos, aluminum castings: without "Foseco" De-Gaser (left) and with "Foseco" De-Gaser (right).

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**280 Madison Avenue**
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# 68 YEARS A FOUNDRYMAN

(*Continued from page* 103)

interrupted for a short time while he satisfied a desire to see more of America by traveling to Seattle where he became foreman of William Hainesworth's foundry at Ballard on Salmon Bay.

Returning to Alliance, Mr. Harrison was married in 1891, and two years later he moved to Cleveland preparatory to assuming the foremanship of Cleveland Steel Castings Co. whose plant was then under construction. The 1893 panic delayed the project, however, and the young foundryman tramped the streets for months looking for work. Times were "rather tough," he recalls.

### Worked on Navy Castings

But times improved, and in March the following year Mr. Harrison went to work for the Bowler foundry on the flats in Cleveland, remaining there until the new steel foundry was completed. After a year with the latter, he joined Otis Steel Co. where he was employed for several years as a leading molder on government work, such as deck lugs, stern posts and other castings for navy ships. In the fall of 1896, Mr. Harrison made application for citizenship, securing his second papers four years later.

Then came an offer, which he accepted, to become superintendent of the Hinson & Herford Steel Castings Co., Converse, Ind., a plant organized by two officials of the National Car Coupler Co., an Illinois corporation, to manufacture railroad equipment parts for which the latter controlled various patents.

The Converse plant used natural gas for fuel, but about 1903 the gas supply in Indiana began to fail. This interrupted the foundry's operations and necessitated the outside purchase of castings for the railroad devices manufactured by the National Car Coupler Co. which, meanwhile, had absorbed the Hinson & Herford Co. Mr. Harrison had become a stockholder of the parent concern, and upon the death of James A. Hinson he purchased the Hinson and Herford interests to assume control of the company and be named president.

It was decided to build a new foundry, and in March, 1906 a site was selected at Attica, Ind., under a contract by which the National Car Coupler Co. agreed to employ 300 men in five years or pay out $600,000 in wages. For this the company received a $30,000 bonus and ten acres of ground from the Attica Land & Improvement Co. With this bonus, matched by a $30,000 bank loan, the company started to build a modern steel foundry, and despite the money panic of 1907 the plant poured its first heat in May that year.

Mr. Harrison was one of three men who poured the first mold in the new foundry, the other two being Ross Gilmore, superintendent, and William F. Walter. Thirty-two years later, Mr. Gilmore, then president of Superior Steel Castings Co., Benton Harbor, Mich., returned to Attica and with Mr. Harrison and Mr. Walter poured another mold as part of the Harrison company's 50th anniversary observance.

The company progressed and expanded during its early years. By 1913 it had more than 300 employes and had paid out in excess of $600,000 in wages, thereby fulfilling its original contract. World war I brought business from foreign countries, and entry of the United States into the conflict resulted in large contracts to supply army tank castings to the former Holt Mfg. Co., Peoria, Ill., and to other companies. In addition, the company leased another steel foundry built in Murphysboro, Ill., for war production. After the war this plant was sold and the foundry equipment was purchased by National Car and transferred to Attica.

By 1924, the National Car Coupler Co. had become a family corporation in stock ownership, and three years later the company's name was changed to Harrison Steel Castings Co. The new name was intended to reflect the more diversified nature of castings being produced. In the same year, Mr. Harrison's youngest son, Wade C. Harrison, was made treasurer, joining the two older sons, Roy and Glen, who previously had been made officers of the company.

Official capacities of the officers remain essentially the same today. Roy J. Harrison, who was water boy during construction of the plant in 1906, is vice president and works manager; Glen W. Harrison is secretary and sales manager, and Wade C. Harrison is treasurer and in charge of purchases. Clara Belle Harrison, mother of the three brothers, is the fifth member of the board of directors.

### Labor Relations No Problem

Labor problems have never troubled the Harrison management or employes. This in itself is a tribute to the democratic policy adopted by the company's founder in his relations with workers, although one little incident probably better illustrates the regard held by the men in the plant for their chief executive. This occurred at the time of the company's 33rd anniversary in 1939, when Mr. Harrison presented autographed photographs to workers who had been employed more than 25 years. Some of the other men felt they also should have photographs, and Mr. Harrison agreed to furnish them. When the requests were collected they numbered more than 600, representing a large majority of the men then on the payroll.

Despite the periodic appearance of slow business, the Harrison plant has managed to operate continuously since its first heat was poured. Today it is operating largely on war work, with nearly 1200 employes on the payroll and production at an annual rate in excess of 25,000 tons of castings.

## Plan Annual Meeting Of Metal Guild

Canton, O., will be the site of the annual meeting of the Electric Metal Makers Guild Inc., on June 4 and 5.

Co-chairmen on arrangements for the two-day meeting are Walter Farnsworth, Republic Steel Corp., Canton; Leroy Bash, Timken Steel & Tube Division, Canton, and Chester Williams, Massillon Steel Casting Co., Massillon, O.

A joint meeting of the castings and ingot divisions will be held Friday morning, June 4, with separate gatherings for the two groups in the afternoon, followed by the annual business meeting Friday evening. Separate sessions will again be held Saturday morning with a combined meeting in the afternoon. The annual banquet on Saturday evening will close the sessions.

Edward Chelius, of the Duquesne works of Carnegie-Illinois Steel Corp., is chairman of the ingot division, and Martin McDonough, National Malleable & Steel Castings Co., Sharon, Pa., is in charge of the castings division. Harry F. Walthers, Timken Steel & Tube, is president, James C. Sweitzer, Sivyer Steel Castings Co., Milwaukee, is vice-president, and John E. Arthur, of Crucible Steel Company of America, is secretary-treasurer.

## Bulletin Discusses Role of Foreman

A specially-prepared bulletin, "Management's Right Hand—the Foreman," which urges management not to "let these men down," has been released by the National Metal Trades Association. The bulletin advising employers to back up the foreman and his decisions, discusses four phases of management's relations with foremen.

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*One of the first women to become a layout inspector at a General Electric Co. plant is shown making calculations required in checking dimensions of a casting for precision war equipment. A high school graduate, Pauline Piotrowski left her job as cashier in a company restaurant 2 years ago, studied trigonometry at home and advanced rapidly to her present job, ordinarily filled by men inspectors with years of mechanical training.*


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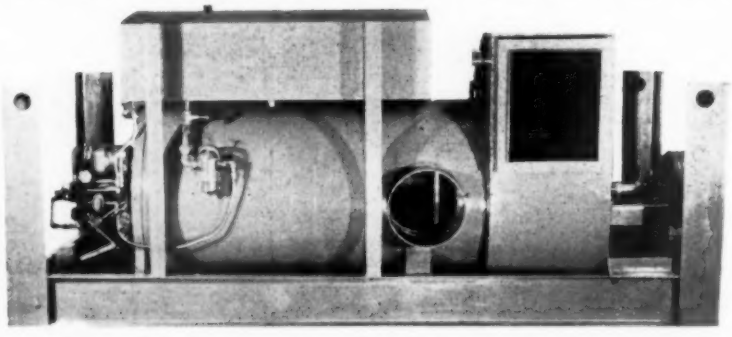

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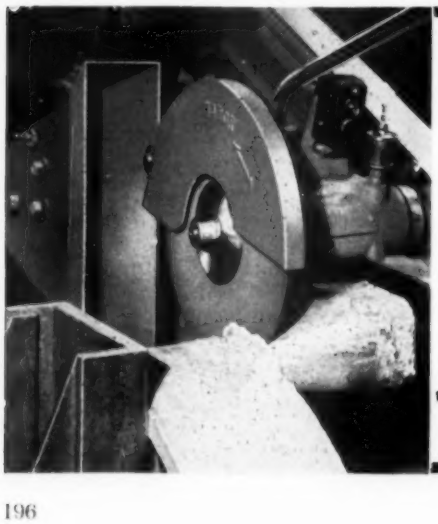

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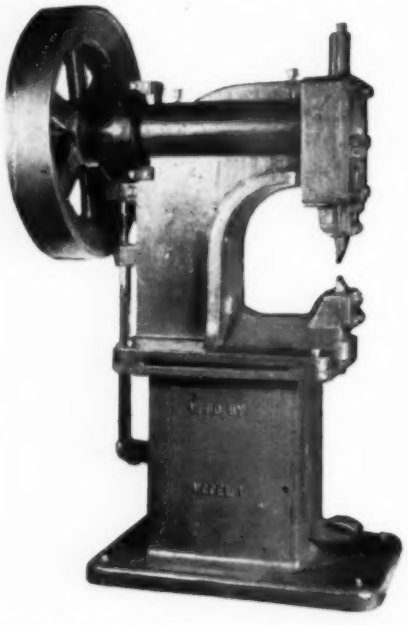

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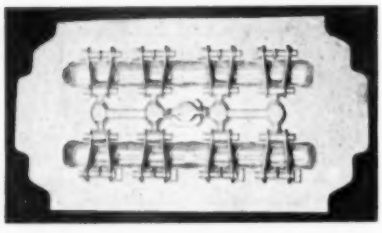

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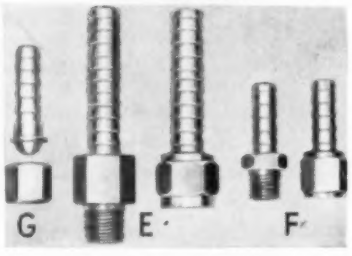


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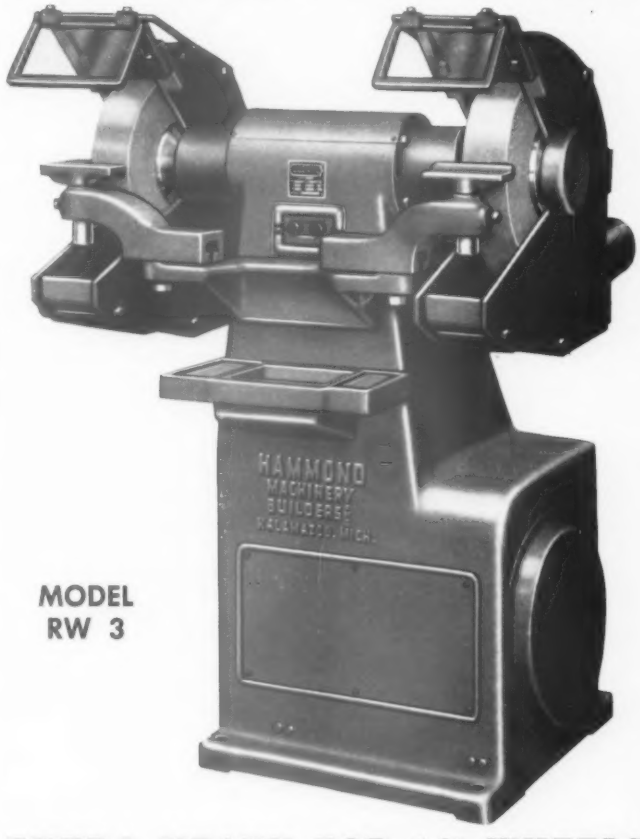


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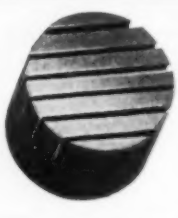

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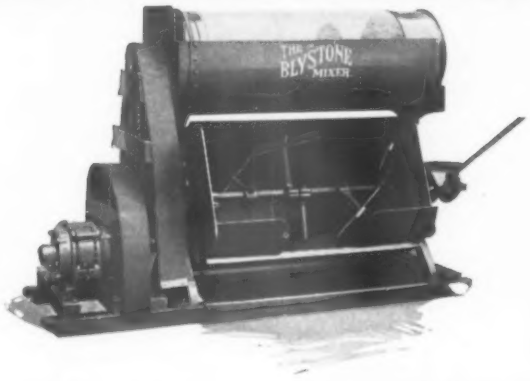


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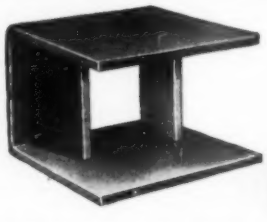

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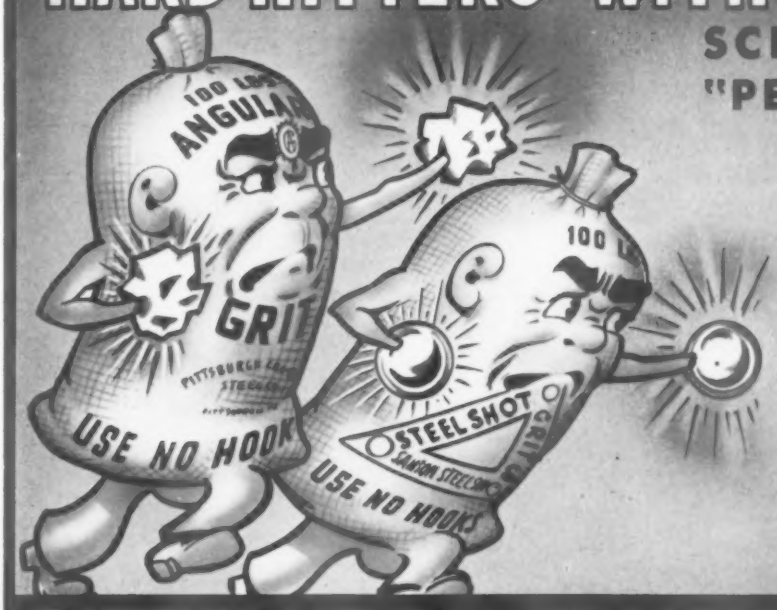


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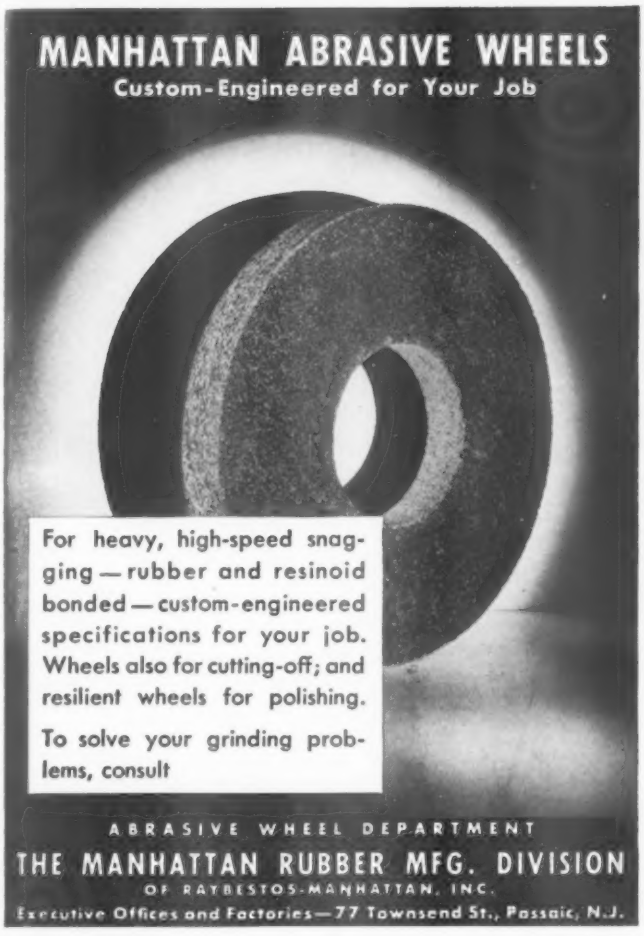

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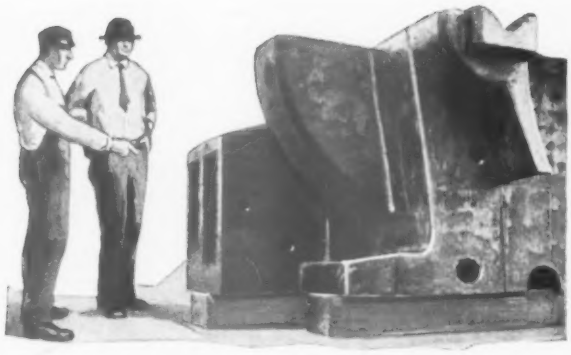

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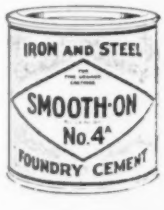


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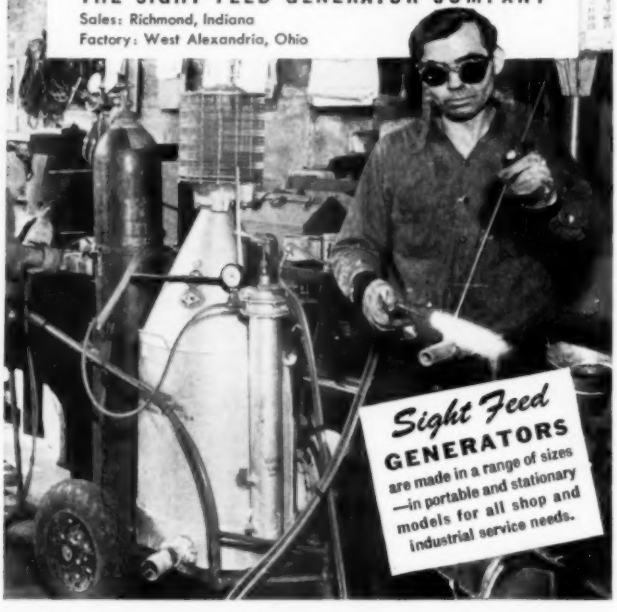
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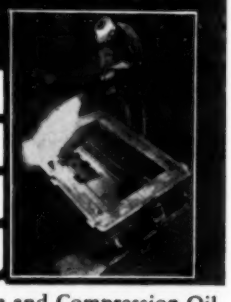

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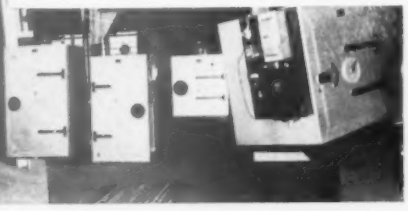

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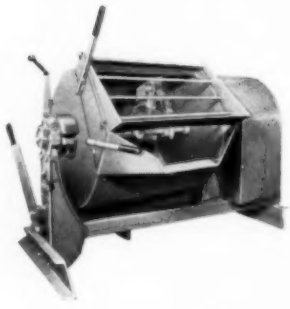

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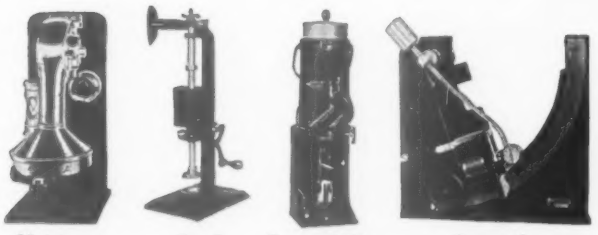

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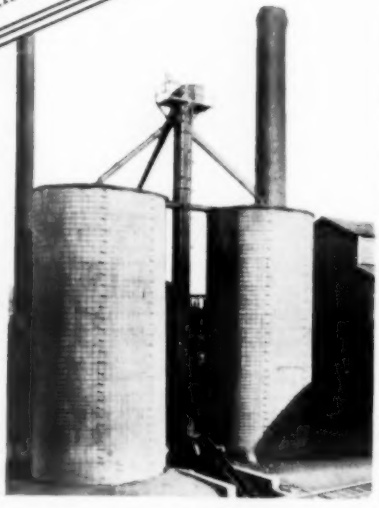

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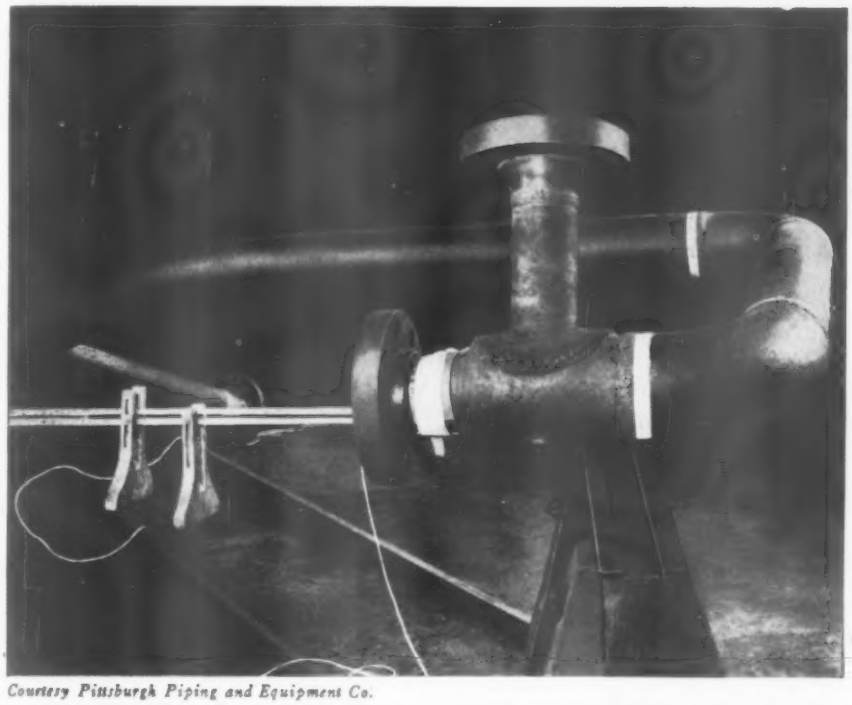

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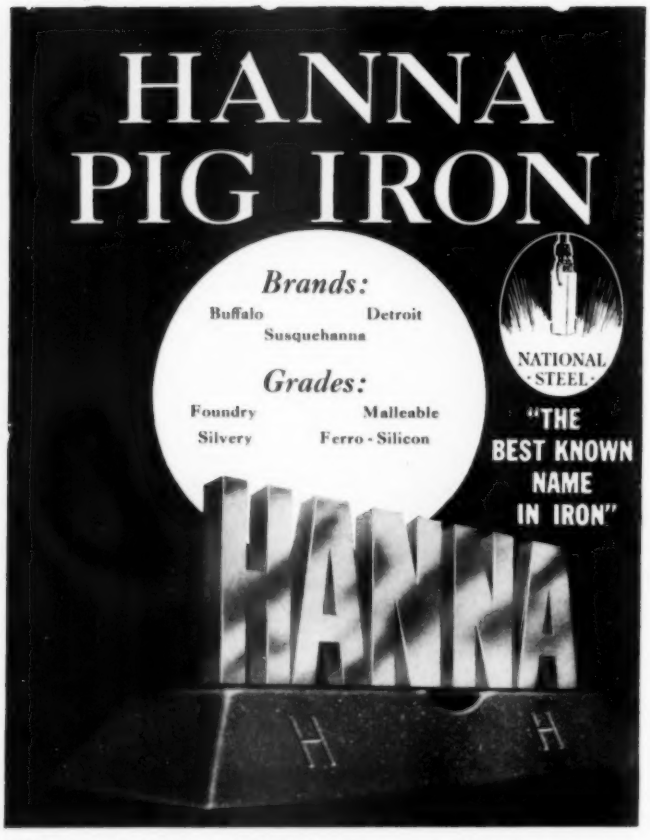


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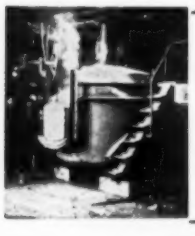

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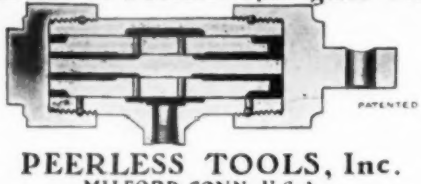


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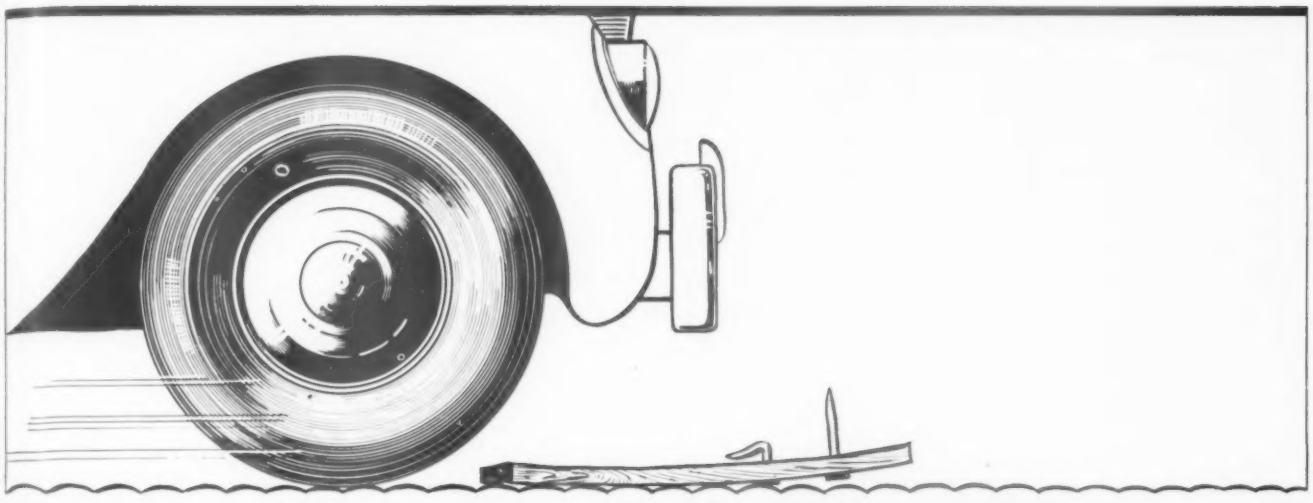

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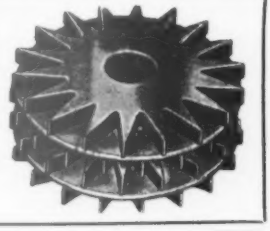

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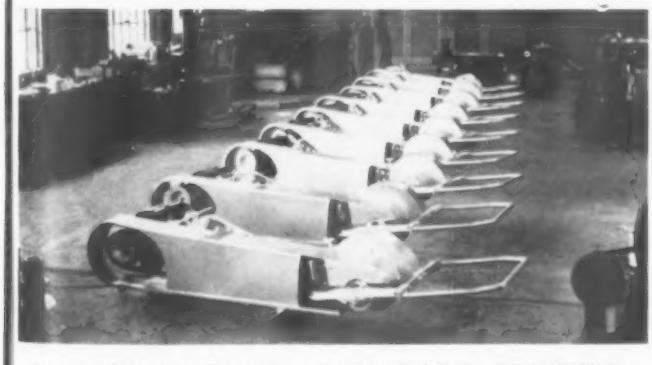

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Forty years' practical and technical experience in all lines and metals. Sixty years of age. Can manage and handle men successfully. Active and energetic. Prefer Middle West Coast. Address: Box 101, The FOUNDRY, Cleveland.

**ADMINISTRATIVE POSITION**

Draft exempt. Under 40. Eighteen years' experience in Mid-Western Steel Foundry in all phases of General and Cost Accounting, Reports, Taxes, Financial, Cost Estimating and Pricing, Production Control, Time and Payroll, Office Management and Personnel. Start $6000. Address Box 111, The FOUNDRY, Cleveland.

**BRASS FOUNDRY FOREMAN**

Brass foundry foreman A-1 on Brass, Bronze and Aluminum. Jobbing and production plumber brass goods. Middle West preferred. Address: Box 974, The FOUNDRY, Cleveland.

**EXPERIENCED FOUNDRYMAN**

Offers 20 years' experience in selling and demonstrating supplies, equipment, binders specialty. Moderate salary. No commission. Address: Box 758, The FOUNDRY, Cleveland.

**ENGINEERING SERVICE**

If your production is low and your loss high, if you feel that general inefficiency prevails in your foundry, let me explain an inexpensive method. Address: Box 959, The FOUNDRY, Cleveland.

**PERSONNEL MANAGER, INSTRUCTOR**

Foundry instructor who has had twenty-six years of practical experience in the trade in various capacities, desires a position. Forty-six years old, graduate of Wentworth Institute and of McLain's Systems. Completed ESMWT courses at California Institute of Technology as follows: Physical metallurgy and metallography laboratory. Address: Box 956, The FOUNDRY, Cleveland.

**PRACTICAL FOREMAN**

With experience in steel, gray iron, semi-steel and alloy castings, is open for position as Superintendent or General Foreman. Best of references. Address Box 885, The FOUNDRY, Cleveland.

**FOUNDRY SUPERINTENDENT OR GENERAL FOREMAN**

Stove, Furnace, light or medium Machine Castings. Fourteen years in charge of Core Rooms, 12 years Foundry Superintendent or Foreman. Molding Machine, Rigging and Cupola experience. Fourteen months teaching foundry practice. Cincinnati district preferred. Address: Box 975, The FOUNDRY, Cleveland.

**FOUNDRY SUPERINTENDENT**

Twenty-five years of experience in all phases of the industry. Have operated both batch melting and duplex melting foundries. Address: Box 123, The FOUNDRY, Cleveland.

**PERMANENT MOLD CASTINGS**

Manufacturer's Representative would like to represent established manufacturer of permanent mold aluminum and other castings in Metropolitan New York and Northern New Jersey. We are sure that we can do a thorough sales job not only for immediate business but to establish a basis for sound business after the war. Have represented four nationally known companies for the past twelve years and have salesmen thoroughly covering the territory. Offices in New York City and Newark, New Jersey.
**BOX 116 The FOUNDRY CLEVELAND**

**FOUNDRY SUPERINTENDENT OR GENERAL FOREMAN**

Age 43, married, know rigging, gating and heading. Practical electric furnace operator. Can handle help. Steel or nonferrous. Address: Box 117, The FOUNDRY, Cleveland.

# Positions Wanted

**METALLURGICAL ENGINEER**

Metallurgical engineer with exceptional nonferrous foundry practice experience desires change. Control and research experience in ferrous field. Minimum salary $5500. Midwest. Address: Box 124, The FOUNDRY, Cleveland.

**FOUNDRY FOREMAN**

A medium sized efficient Iron Foundry Foreman desires work. Is free to go any place in the country. Address: Box 115, The FOUNDRY, Cleveland.

# Employment Service

**SALARIED POSITIONS**

This advertising service of 33 years' recognized standing negotiates for high salaried supervisory, technical and executive positions. Procedure will be individualized to your personal requirements and will not conflict with Manpower Commission. Retaining fee protected by refund provision. Identity covered and present position protected. Send for details.
**R. W. BIXBY INC.**
**101 Delward Bldg. Buffalo, N. Y.**

**GRAY IRON FOUNDRY EMPLOYMENT**

We are receiving many inquiries for superintendents, metallurgists and foremen. We shall be glad to hear from qualified men. No charge.
**Gray Iron Founders' Society Inc.**
**1010 Public Square Building Cleveland, Ohio**

# Wanted-To-Buy

**WANTED TO BUY**

One 1000 or 2000 lb. used US Jones Furnace. State condition, lowest cash price, etc.
**ADDRESS: BOX 999,**
**THE FOUNDRY, CLEVELAND**

**MIXERS WANTED**

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price for immediate acceptance. Address Box 578, The FOUNDRY, Cleveland.

**WANTED**

6,000 C. F. M., 16-20 oz. centrifugal cupola blower direct connected to motor. Motor specifi. 3/60/440.
**ST. PAUL ENGINEERING & MANUFACTURING CO.**
**FORMERLY ST. PAUL FOUNDRY**
**500 COMO AVENUE ST. PAUL, MINN.**

**WANTED AT ONCE**

One 36" Barrett Cupola, with Blower, Motor, and Starter, complete, for 220 volt, 2-phase, 60-cycle current. Address full particulars to:
Box 105 The FOUNDRY
Cleveland

**WANTED**

Will buy several No. 432 Osborn molding machines. Write or call Frank Foundries Corp., Moline, Ill.

**WANTED**

Core Rod Straightener to straighten rods one inch diameter. Address: Box 963, The FOUNDRY, Cleveland.

**WE WANT**

Used small air compressor with tank, 10 to 15 cubic feet per minute. Give condition and price. Address: Fenton Foundry Supply Co., Dayton, Ohio.

**WANTED**

Used Simpson or Lancaster intensive mixer, four or five foot pan, motor drive. Address: Box 962, The FOUNDRY, Cleveland.

# Foundry for Sale

Foundry equipped to make castings from 25 lbs. to 20000 lbs. Foundry building constructed of Brick, Steel & Concrete with Asbestos Sheet Roof. Three story brick pattern storage building. One city block of property with side-track. Now working. Located in Eastern Ohio. Address: Box 970, The FOUNDRY, Cleveland.

**FOR SALE**

Small grey iron foundry with limited nonferrous facilities in active Gulf Coast area. Now in operation. Address Box 108, The FOUNDRY, Cleveland.

**FOR SALE**

Completely equipped foundry and stove factory on railroad siding, now in operation located in mining town in Northern Mexico. For particulars address: F. P. Low, Apartado Postal 3, Parral, Chih., Mexico.

# Foundry for Sale

**FOR SALE**

Gray iron foundry, equipment, material and stock of castings. Also manufacture sawdust burners and hot water heaters. Good jobbing and burner trade. Owner died. Address: Mrs. Edith Reilein, 1509 24th Ave., Longview, Wash.

**FOR SALE**

Electric Steel Foundry equipped to make castings ½ pound to 6000 pounds. Building constructed of steel brick concrete also fire proof pattern storage and pattern shop. Foundry modern and equipped for production, now working 100% defense with orders on hand for many months. Clientele A-1. Reason for selling, ill health. This proposition will bear investigation. Address: Box 121, The FOUNDRY, Cleveland.

# For Sale

**FOR SALE**

Two Whiting Cupolas about five years old in good condition. One No. 7 with a 72" shell and one No. 8 with a 78" shell.
One Scale Car manufactured by Lake Erie Engineering Co. Five years old and used in conjunction with the two cupolas and the electric charger. It is complete with a 20,000-lb. capacity Buffalo scale, three 48 cu. ft. buckets, three buckets with a 34 cu. ft. capacity, a 5 h.p. Westinghouse electric motor (440 volts, 3 phase, 60 cycles, drum type controls), and an extra 5 h.p. motor for emergency replacement.
The Charger is complete with a 6000-lb. hoist powered by a 10 h.p. Cleveland motor, plus an extra 10 h.p. Cleveland stand by motor. The travel force is supplied by a 5 h.p. Westinghouse motor. All these motors are 440 volts, 60 cycles and 3 phase.
**ADDRESS: BOX 998**
**THE FOUNDRY CLEVELAND, O.**

**FOUNDRY EQUIPMENT FOR SALE**

1—No. 8 Whiting Cupola.
1—No. 6 Roots Blower.
1—New Haven Sandblast.
1—Otis Freight Elevator, complete with 7½ H.P. Motor.
1—50 H. P. Motor.
13 One Man Ladle Buggies.
8—300-lb. Ladles.
1—Novo Outfit Hoist, complete with 5 H.P. Motor.
1—Sundry plates and I Beams.
Miscellaneous tools and equipment.
1—Koppel Industrial Car.
1—Howe Platform Scale—Cap. 5 Tons.
Address: Box 992
**THE FOUNDRY CLEVELAND**

**FOR SALE**

One No. 4 Whiting cupola in good condition. Reasonable. Write KEEN FOUNDRY COMPANY, GRIFFITH, INDIANA.

**FOR SALE**

1—TYPE L.F.X. DETROIT ROCKING ELECTRIC FURNACE rated 500 lbs. capacity per charge—with extra shell, transformer 175 KW—4600 volt, 60 cycle, instruments and panel. Address: RILEY STOKER CORP., FT. OF WALKER ST., DETROIT, MICH.

**WELDING EQUIPMENT**

Welding, Cutting, Aircraft, Sheet-Metal, Soldering Outfits, Torches, Regulators and Gages, Acetylene Generators, Supplies, Electric Arc Welders. SUPERIOR OXY-ACETYLENE CO., HAMILTON, Dept. B, OHIO.

**SECOND HAND MACHINERY**
COMPLETE SAND DRYER

Rotary drier 80" in diameter and 40' long. Also all necessary auxiliary equipment including conveyors, elevators, exhaust fan, motors, starters, etc. Address: Box 994, The FOUNDRY, Cleveland.

**FOR SALE**

1—E O T Electric overhead travel 10 ton Morgan Crane. A-1 shape. Completely rebuilt. Three motor cage operated crane hoist and trolley with trucks. Bridge of two-beam roll section reinforced for side sway. Maximum lift 40', 46'-10½" span. 220 volt D.C. current. Address: Box 993, The FOUNDRY, Cleveland.

**FOR SALE**

1—Sly round tumbling barrel 44" x 60".
1—Sly round tumbling barrel 48" x 60". Complete with shaft, motor, etc. In good condition; on foundation at present. Address: Box 966, The FOUNDRY, Cleveland.

**USED TRANSFORMER FOR SALE**

1—General Electric Circular Coil H Design Transformer for Arc Furnace, No. 2297426, Type WCT Form HDDP, 60 Cyc., 500 KVA Continuous 55 Degree C. Rise. Rated volts full winding 12575 to 100. Operating volts full winding 13200 to 100 at .90 P.F. Delta primary, for indoor installation only. Equipped with thermometer, oil level gauge, vent, oil and water connection valves. Height overall 90 inches; width 32 inches. Overall length with connections 77 inches. Approximate weight 8000 pounds. This Transformer is in excellent working condition.
**THE BREWSTER CO., INC.**
**SHREVEPORT LOUISIANA**

# For Sale

**REBUILT**

**BLOWERS—FANS—EXHAUSTERS**

Roots-Connersville positive cupola blowers. Centrifugal blowers for gas and oil burning. Sand blast, grinder end dust exhausters. Ventilating fans.

**GENERAL BLOWER COMPANY**

**406 N. Peoria St.** **Chicago, Ill.**

---

**AIR COMPRESSORS**

BELTED—176 ft., 355 ft., 540 ft., 676 ft., 752 ft. & 1300 ft.

ELECTRIC—355 ft., 528 ft., 676 ft., 807 ft., 1302 ft., 1723 ft., 2022 ft., 2200 ft., 2800 ft., 3600 ft., & 5000 ft.

**STEEL TANKS**

9—5000 gal., 11,500 and 18,000 gal. cap.
17—1000 bbl., 4000 bbl. and 10,000 bbl. cap.

**TANKS BOUGHT AND SOLD**

**R. C. STANHOPE, INC.**

60 East 42nd St. New York, N. Y.

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**FOR SALE**

One No. 7, 60" dia. 30' 0" high Whiting Cupola. One 46" dia. 30' 0" high. Both complete with blowers. Address Otto Biefeld Company, Watertown, Wisconsin.

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**REBUILT USED EQUIPMENT**

Molding machines, all types; tumbling mills; furnaces; cupolas; air compressors; hoists; rammers, all types; ladles, all types; sand mixers; sand blast tanks; core machines, etc. All equipment rebuilt and guaranteed. All sizes used steel flasks.

**HAYNES FOUNDRY EQUIPMENT COMPANY**
**1734 Lake St.** **Kalamazoo, Mich.**

---

**EQUIPMENT IN STOCK**

**GUARANTEED IMMEDIATE SHIPMENT**

**MISCELLANEOUS ITEMS**

(1)—No. 60 Crucible Fisher Stationary Furnace, oil fired with new lining and cover.
(2)—1¾" cap. Shuster Power Sprue Cutters.
(4)—Large Flask Vibrators.
(1)—8-ft. Diameter Simpson Sand Mixer.

**AIR COMPRESSORS & BLOWERS**

(1)—12 x 10 Penna. 365-CFM. @ 100 lbs. belt drive, 60-HP. C.W. slip ring motor, 220/-3/60-cy.
(1)—No. 4 Wil. Green Positive Pressure cap. 13-cu. ft. per rev.

**ELECTRIC MONORAIL HOISTS**

(30)—¼ to 5-ton, 1 and 2 motor, Fl. and Cage operated, 220/440-volts, 3-PH. 60-CY. 110 and 230-VDC.

**OVERHEAD ELECTRIC TRAVELING CRANES**

(1)—To 50-tons cap. 18'0" to 91'0" span, 220/-440-volts, A.C. and 230-VDC. We operate the largest crane rebuilding plant in the country. Send us your specifications for Cranes, Electric Monorail Hoists, Crane Motors, Standard Motors, Steel Buildings and Runways. We can quote you on equipment rebuilt to your specifications.

**T. B. MacCABE CO.**

**4304 CLARISSA ST.** **PHILADELPHIA, PA.**

---

**REBUILT COMPRESSORS AND BLOWERS**

(3) Buffalo Forge Pressure Blowers, 1200 cfm @ 11 oz., 9½" inlet, 7 x 7 outlet, driven by 7½ H.P. A.C. Motors.
450 CFM, 3500 RPM Gen. Elec. with 6.2 H.P. A.C. motor drive.

**SAND VIBRATOR**

Jeffery-Traylor, shaker type CVS-8, 6" wide hand deck, capacity 7 to 8 tons sand per hour; with 15 cycle, 110 volt, single phase vibrator motor generator set. Write, wire or phone.

**The Motor Repair & Mfg. Co.**
**1552 Hamilton Ave.** **Cleveland, Ohio**

# For Sale

**FOR SALE**

2—Used 9½ Whiting Cupolas, 90".
In First Class Condition.
The Above Subject to Prior Sale.

**CRANE CO., SOUTH AVE.,**
**BRIDGEPORT, CONN.**

---

**FOR SALE**

**USED EQUIPMENT**

2—No. 5 Whiting Cupola Wind Boxes complete with doors and legs—no stacks—capacity 5-6 tons per hour.

1—Whiting No. 3 Annealing Kiln Unit Pulverizer—500 lbs. hr.—complete with 2-ton Coal Hopper.

1—Eastern Machinery Traction Type Elevator 4000-lb. Capacity at 50 ft. per minute—hoist, sheaves suitable for Car Size 7'-2" x 7'-2" x 6'-6" high, 440 volts, 3 phase, 60 cycles.

1—Eastern Machinery Draw Type elevator—Hoist, sheaves, etc. suitable for Car Size 7'-0" x 7'-0" x 6'-6" high, 440 volts, 3 phase, 60 cycles.

1—Portable Jaeger 1 bag Cement Mixer, Serial 34280, 6 H.P. Gasoline Engine 325228, 450 RPM.

1—General Electric Turbine, 500 KW, 3600 RPM, 480 volts, 3 phase, 60 cycles.

1—Cage control shepard monorail type electric hoist, capacity 2 tons, 2 wire, 220 volts DC, 20' lift, hoist speed 20 to 40 ft. per min., trolley speed 225 to 250 ft. per minute.

**SUBJECT: Specifications on 3-Ton Cupola Charging Crane**

The following are specifications of the Cupola Charging Crane now on hand in steel foundry. Crane in good operating condition.
The crane is of the transfer type, 3 motor, cab operated for operation on direct current, 220 volt, 2-wire. The capacity is 3 tons. Approximate span of bridge, 26 ft.; lift 40 ft. Controllers are located in monorail cab, and operator's cage is on monorail. The bridge girders are of the box type, having 15" beams on the monorail.
The motor capacities are as follows: Hoist, 20 BHP; Trolley, 6 BHP; Bridge drive, 6 BHP.
Speeds are as follows: Hoist 67-167 ft. per minute, full load and no load respectively; trolley 250 to 300 ft. per minute, full load and no load respectively; and bridge drive 250 to 300 ft. per minute, full load and no load, respectively.
We do not have any loading buckets.

**MALLEABLE IRON FITTINGS CO.**

**BRANFORD** **CONNECTICUT**

---

**SPECIAL DEFENSE BARGAINS**

Blowers-Fans-Exhausters for Dust, Ventilation, Combustion, Rotary, Multistage, Multivane for all services, hundreds in stock, send specifications for your need.

Air Compressor, Worthington 52' cap. vertical feather valve. Worthington 8½ x 10 horiz. double acting approx. 225' cap. Many others also receivers.

**Furnaces** for Brass and Aluminum Melting—Hausfeld Tilting Brass or Aluminum open flame, 400 lb. brass cap.; Booth Electric 725 lb. brass cap. with instruments. Stationary Furnaces, swing top for crucibles No. 60 to No. 150 and open top for iron pots up to 300 lb. aluminum.

**Molding Machines**—No. 75-J Osborne jolt-squeeze portable, Osborne Stationary Jolt-squeeze-strip or lift 14 x 23 x 6" lift, hydraulic controlled draw. Arcade type portable squeeze—"Berkshire" 34" wide stationary air squeeze. "Tabor" 8" cyl. air squeeze "Battenfeld" (Johnston & Jennings) stationary jolt squeeze; 5 in stock. Adams—Stationary hand squeezers 48" wide 2 in stock. Mumford—Stationary Air Squeeze 14 x 18" platen.

**Crane Ladles** spur geared rim pour 3 tons cap.

**Sand Blast Room**—All steel 9'-10" x 20'-9" operators grilled table 3' x 10', down draft dust exhaust—8' ceiling. Air inlet thru ceiling with 1000-lb. sand capacity pressure generator tank.

**Core Oven**—2 portable insulated gas fired 4 shelves each.
1—with shelves 37" wide x 22" deep 6" high.
1—with shelves 29½" wide x 22" deep by 7½" high.

**AIR HAMMERS** for chipping, Ingersoll portable grinder.

**TUMBLER, Ransohoff** All Steel 4' x 4' round, ¾" thick shell, reversing mechanism for separating stars, ball bearings, with 15 H.P. A C motor and controls practically new.

We have many attractive machines listed. Send your inquiry with full specifications for your AIR & FOUNDRY needs.

**CLIFTON MACHINERY CO.**
**1023 W. 6th, CINCINNATI, O.**

# For Sale

**FOR SALE**

Annealing pots and bottoms, Cupola and furnace from malleable castings foundry.

**Immediate Delivery**

**Chicago District**

**HYMAN-MICHAELS COMPANY**

**122 S. Michigan Ave.** **Chicago, Ill.**

---

**FOR SALE**

3—Model—AA Sand Cutters.
1—HP Sand Cutter.
1—Portable Howe Platform scales. (4 ft. square platform).
1—No. 4 Root Positive Blower.
7—JW 275 J Osborne Jolt Squeezers.
1—Pridmore 24" x 8" draw.
2—Pridmore 14" x 6" draw.
2—Milwaukee Jolt Squeezers.
6—Osborne J 75 Jolt Squeezers.
4—International JS 2 Jolt Squeezers.
3—30 x 48 Sly Tumbling Mills. (Motored with 5 horse motor Jones reducer individual drive).
1—Newton cupola 40" shell with Sturtevant Blower.
1—Sturtevant No. 13 Positive Blower with Morse Chain Drive and 125 hp G. E. Induction Motor BLOWER—High pressure rotary blower. Bottom inlet, 29" d. Top outlet. Blower chamber (oval section) 75" wide x 68" high x 71" long. Two 7" D. bearings each end. 20" long bearing caps plus 14" gear case one end, and 14" pinion overhang other end, make total length app. 12 ft. Wt. (without motor) app. 30,000 lbs. Rated when new 13400 C.F.M. at 18 oz. pressure when turning 200 r.p.m.—require 125 hp.

DRIVE—12" face 1½ pitch Morse Chain 104 pitches long. 19 tooth motor pinion. 55 tooth driven sprocket.

MOTOR—G. E. induction motor 125 hp type 1-154, 440 v-3c, 60c. 585 r.p.m. Model No. 9564, Serial No. 4025601.

CONTROLS—G. E. T108 Controller No. 560087, 15 Resistor Bank.

1—Electric Melting Furnace—Heroult type Electric Melting Furnace, originally designed for 2000 lbs. to 2500 lbs. capacity. This furnace shell was later re-designed for 3300 lbs. capacity (approximately 12 to 14 tons per day), complete with transformers (2200 volt primary—90 to 110 secondary) and controls. Automatically operated electrodes, hand operated, gear driven, tilting device. One extra ladle, large quantity of 3" electrodes, set of ingot molds, one electric pump for the water system and piping for water cooling, excellent condition. 3 phase. Total capacity consumption of Power 600 K.W.
1—26" Band Saw.
1—Molene Hand Squeezer.
Core Plate, Aluminum 79—16 x 35.
Core Plate, Composition 100—7½ x 32.
Aluminum Ribbed Core Plates—

| | | |
|---|---|---|
| 6" | x 6" | x ¼ |
| 12" | x 16" | x ¼ |
| 5¼" | x 21½" | x ¼ |
| 11" | x 21½" | x ¼ |
| 9" | x 14" | x ¼ |

3—300 KVA, 7200-440V transformers. These transformers are in first class condition.

A shot or sand blast room approximately 8' x 10' x 7' with a 6' diameter turn table with elevator, sifting and pit equipment. Practically new.

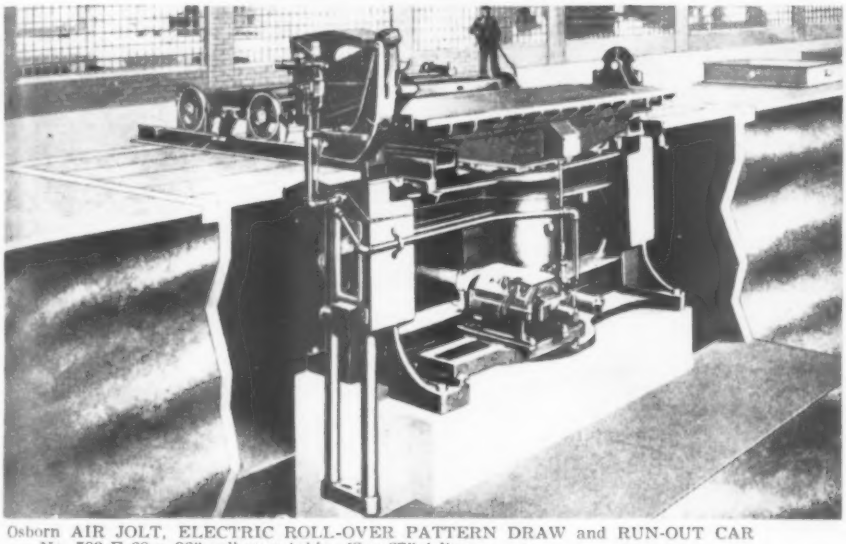
1—12 x 14 Chicago Pneumatic Air Compressor horizontal, 75 H motor, starter and switch.
1—10 x 10 bury, horizontal Air Compressor, V-belt drive, with starter and switch, 40 H motor.
1—Ford Engine Compressor with V-belt drive, switch and starter, with 20 H motor.
1—New Haven Sand Blast Barrel, 36 x 46 with 3 H motor and speed reducer.
1—Duster Rester, practically new, 12 x 8 x 7 with forty-eight 8" Pangborn bags.
1—No. 13 Ball-bearing Exhaust Fan, with 5 H motor, V-belt drive.
1—Whiting 78" Cupola.
1—36 x 48 Sly Tumbling Mill, with 1" shell, practically new.
Air Tanks—many sizes.
Rebuilt Chipping Hammers (rebuilt in factory, guaranteed)
2—Generator Tanks.
3—30 x 48 Tumblers with Jones Speed Reducer, with 5 H motor.
1—24 x 60 Tumbler with Jones Speed Reducer, with 5 H motor.
1—Plain Bumper, with 5' square table.
1—International, type F, 26 x 8" draw, air jolt, air roll, and air draw.
1—International, type F, 30 x 12" draw, air jolt, air roll, and air draw.
60—Steel Flasks, 18" x 18", 10" cope, 3½" drag.
1—Elevator, 4000 lb. capacity, 10 H motor, 7" x 8" platform.
1—Noble Brass Separator.

**HAYNES FOUNDRY EQUIPMENT COMPANY**
**1734 LAKE ST.** **KALAMAZOO, MICH.**

# SCULLY Reconditioned Foundry Equipment

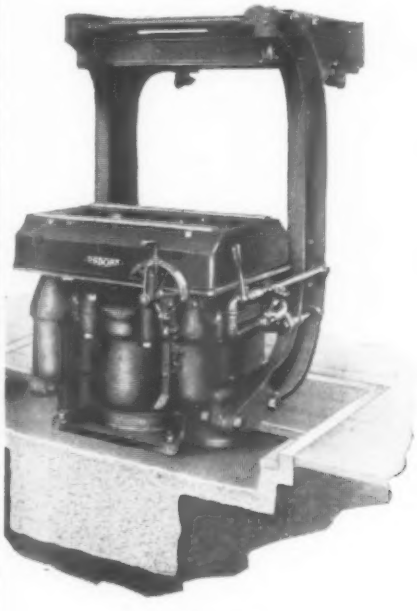
★ ALL SCULLY EQUIPMENT IS REBUILT AND OVERHAULED IN OUR OWN, NEW MACHINE SHOP

## OSBORN MOLDING MACHINE



Osborn AIR JOLT, ELECTRIC ROLL-OVER PATTERN DRAW and RUN-OUT CAR
No. 509-E 60 x 96" roll-over table, 42 x 87" jolter.
No. 513-E 36 x 124" roll-over table, 36 x 112" jolter.

## OSBORN JOLT SQUEEZE & POWER STRIP



**No. 703 OSBORN**
**(Similar to above excepting with roll-off)**

No. 703-6 Osborn jolt squeeze and strip, 21 x 28" table, stationary. Length of opening in lifting frame 34", 6" pattern draw, 8" cyl. dia. 1000 lbs. jolting cap. @ 80 lbs. press. Distance from lifting frame to squeeze head 24¼", flask length 44½" with roll-off conveyor.

No. 703-5 Osborn, same as above, excepting 17 x 35" table.

## JOLT SQUEEZE STRIPPERS

No. 142 Milwaukee, stationary, 1200-lb. cap. @ 80 lbs., 6" draw, table 19 x 35"—open end type.

No. 113 Milwaukee, open end type, portable, 500-lbs. cap. @ 80 lbs., 6" draw, 16 x 35" table.

Osborn No. 82 STRIPPING PLATE JOLT SQUEEZER, 46" between rods, 10" draw, 1200 lbs. jolting cap., 1000 lbs. stripping cap. 24 x 36" table, pin lifts 12" part one way, 36" the other.

Nicholls Type "D" stationary heavy duty JOLT SQUEEZE & PATTERN DRAW, squeeze piston 14" jolt piston 6", draw 2-6"—distance between strain rods 40" take approx. 15 x 24" flask.

## MISC. MOLDING EQUIPMENT

No. 330 Arcade portable, jolt roll-over, squeeze pattern draw, 10" draw, distance between uprights 44".

Osborn No. 332 jolt roll-over and squeeze, flask cap max. length 36" width 26" pattern draw 9" jolt cyl. dia. 7", 750 lbs. jolting cap. @ 80 lbs. press., 44" between uprights.

## HERMAN Independent Turn-Over and Pattern Drawing Device

60 x 84" roll-over, 60 x 72" bumper, 10,000 lbs. cap. @ 80 lbs.

60 x 72" roll-over, 60 x 72" bumper, 10,000 lbs. cap. @ 80 lbs.

40 x 56" roll-over, 40 x 58" bumper, 3000 lbs. cap. @ 80 lbs.

## MOLDING MACHINES

No. 49 Davenport jolt roll-over draw, outside flask cap. 50 x 72" pattern draw 18"—4500 lbs. cap. @ 80 lbs. pressure, jolt cyl. dia. 14".

Type "F" 49 x 16" draw, comb. jar ramming, power turn-over and power draw, fitted with air equalizers, rollers in the draw section and hand operated core box clamps (rollers can be readily removed) jar plate 100" long, 6000 lbs. cap. @ 80 lbs. pressure.

International Type "F" comb. jar ramming power turn-over power draw, 26 x 12" draw, 900 lbs. cap.

## AMERICAN SANDCUTTERS

Model "AA" size 62, having 54" cutting cylinder, complete with 7½ HP 3/60/220V AC Motor, Cable and Take-Up Reel.

Model "AA" size 62, 66" between tractor wheels, 4" face—O/A width 85" Length 96" and Height 80"—equipped with 4 cyl. Waukesha Gas Engine.

Cleveland-American (similar to Model "K") 84" spiral cutting cyl., 36" dia., 92" between tractor wheels, 5" face—equipped with Cleveland 3-phase 60 cycle 220V AC Motors, Cable and Take-Up Reel.

**NO. 2 DEMMLER CORE BLOWING MACHINES**

## EXHAUST TUMBLING MILLS

48" dia. x 72" long, 1" plate Whiting door opening entire length of barrel, renewable trunnions, pulley drive.

40" square x 84" long Sly, ⅞" plate door opening entire length of barrel, renewable trunnions, pulley drive.

LOT 34" dia. x 74" long Whiting, door opening entire length of barrel, renewable trunnions, clutch pulley drive.

Sly CONTINUOUS TUMBLING MILL 19 ft. long 26" dia. inside of liners, center of barrel and liners perforated and covered by steel hood with exhaust connection, equipped with silent chain gear drive (without motor).

## MISCELLANEOUS

American Pulverizer Type "S" CORE CRUSHER 30 x 39 opening on base plate direct connected to American Elec. 35 HP 3/60/440V 570 RPM AC Motor.

Productive Eqpt. approx. 3 ft. wide, 8 ft. long VIBRATING SHAKE-OUT SCREENS, 3 ft. high, 62" width O/A 1 unit having perforated plates, extended shaft (requires 5 HP 1800 RPM Motor for operation).

No. 3, 8 ft. dia. double muller SIMPSON MIXER, arranged for motor drive, but without motor, with gear reduction and outboard bearing, mullers 11 x 34" dia.

**SCULLY MACHINERY & EQUIPMENT CORP.**
(Formerly - Foundry Division of Scully-Jones & Co.)
2031 WEST 74th STREET (Phone PROspect 8770) CHICAGO, ILLINOIS

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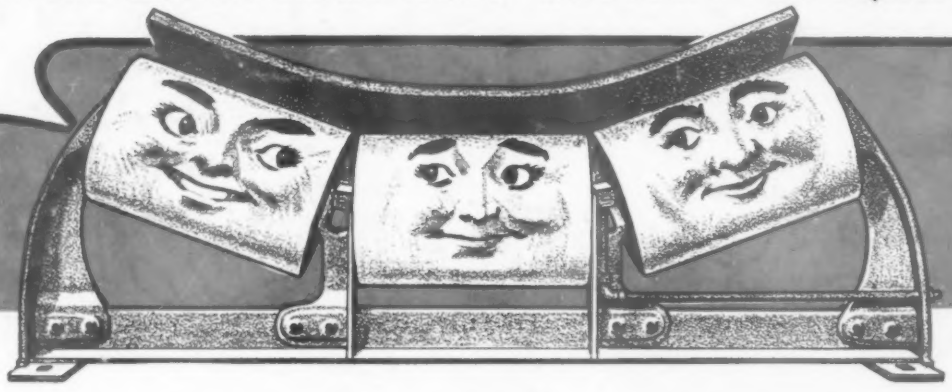
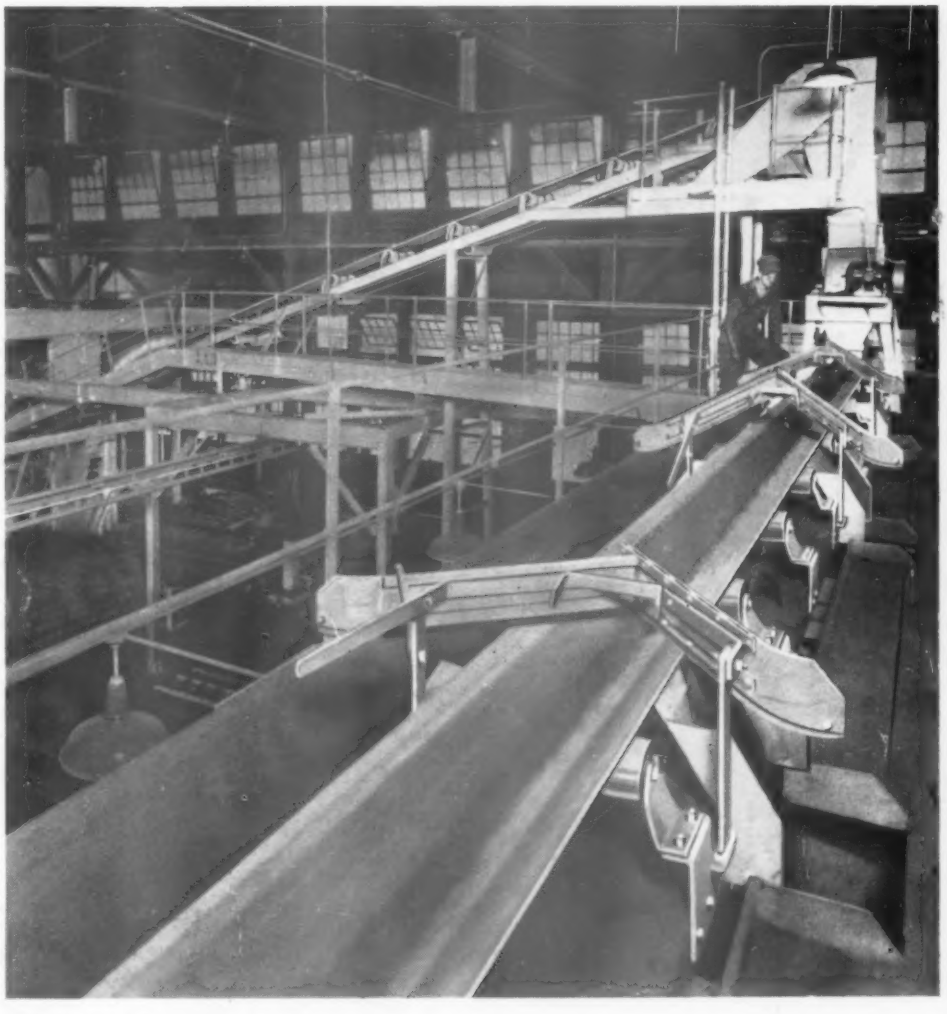
# BE WISE—PROLONG THE LIFE OF CONVEYOR BELTS AND BELT CONVEYOR EQUIPMENT!



"we" could only talk—here's what ay: "Operators, please give us extra l care to make us last longer. This is y important during wartime, because ials used in belt conveyor equipment eeded for guns, tanks, planes and war equipment. Be wise—be patri- follow this advice—it will pay extra nds in trouble-free operation."



**EP INSTALLATION CLEAN.** Cleanliness n important part in prolonging the life of lt conveyor equipment. Make a daily in- n to see that there is no accumulation of l that has spilled off the belt. If material is oved it will cause the belt to drag over it us around the head, tail, snub and other Consideration should also be given to the belt. The material being handled nes the type of cleaning device.

**.N THE BELT AND MAINTAIN THE NG WITH SELF-ALIGNING IDLERS.** ortant that both the carrying and return conveyor belt be kept practically central upporting idlers. This can be accomplished erly "training" the belt on the conveyor . . ning that training is assured through the lf-aligning idlers and return rolls. Link-Belt tures a complete line of self-aligning idlers every need.

**AINTAIN PROPER BELT TENSION AND CATION.** Eliminate excessive belt sag be- ller rolls—Proper tension relieves the belt unnecessary wear . . Never over-lubricate ls—inspection of one idler roll will often ne at what intervals equipment should be ed. Too much grease is as bad as too little.

**ND MAKE IT A RULE** to establish regular inspection periods — and make replacements with genuine Link-Belt rts when necessary. Link-Belt manufactures a complete line of idlers, pulleys, bearings, take-ups, drives, trippers, etc.

# LINK-BELT

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- Does not curl up under the tool.
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